MARINE REVIEW

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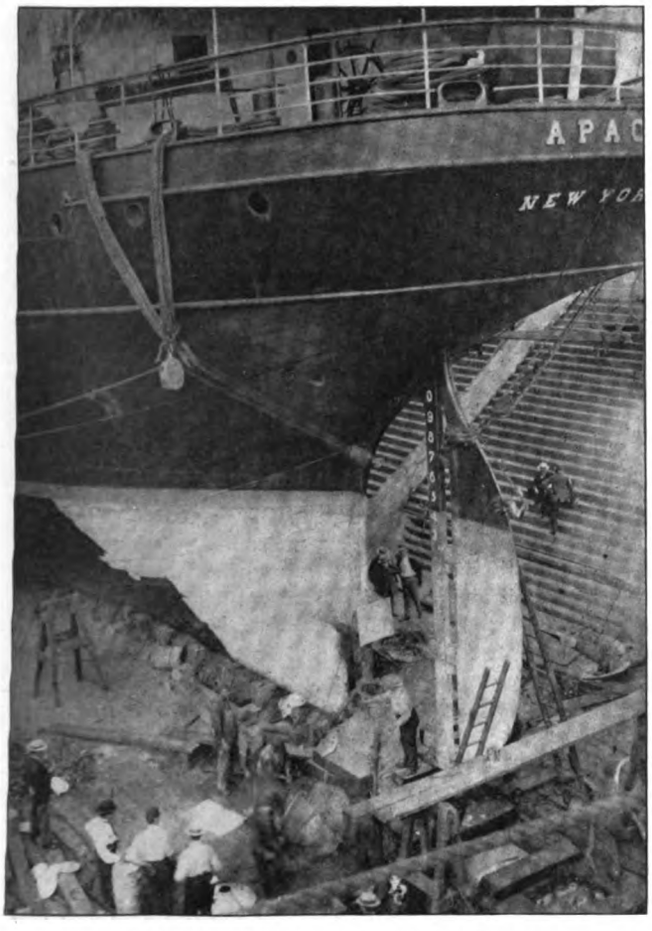
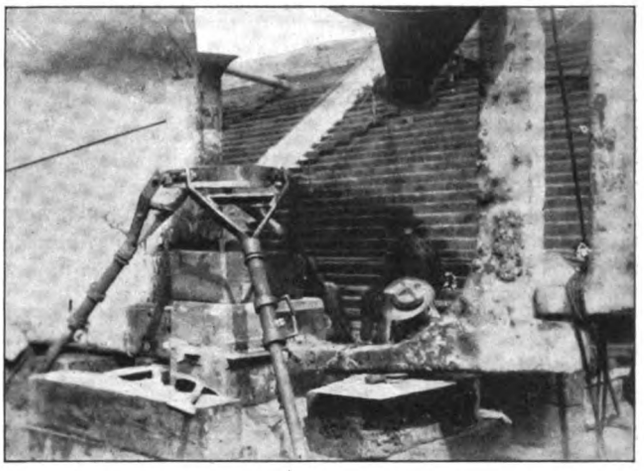
WELDING STERN FRAME OF APACHE

The details of welding the break on the stern frame, or more properly speaking, the shoe or skeg of the steamer Apache of the Clyde line on July 28 last, are given as follows:



GENERAL VIEW. MOLD IN POSITION.

The Apache was placed in drydock about 1 p. m. The dock was a graving dock, and the water was entirely pumped out at 2:15 p. m. Propeller wheel was removed and shaft drawn in to the hull, for the purpose of examining same for the benefit of underwriters. It was not necessary to remove the wheel and shaft to perform the work. The shoe, or skeg, as it will be afterward referred to, has been broken and



MOLD IN POSITION. READY TO PLACE CRUCIBLE.

patched; two large plates had been placed, one on each side, about 2½ in. thick each, and about 16 in. wide. Top and bottom plates had also been put on, forming a box, as it were, around the break. These were removed at 3:20 p. m. The break was found to be about 18½ in. from the after side of what is termed the "stern post" (not the rudder post).

A mold and mold box had been previously prepared from the blueprint, reproduced herewith. Allowances were made in the clay mold so that it could be fitted tight to the

CHARGING CRUCIBLE WITH THERMIT.

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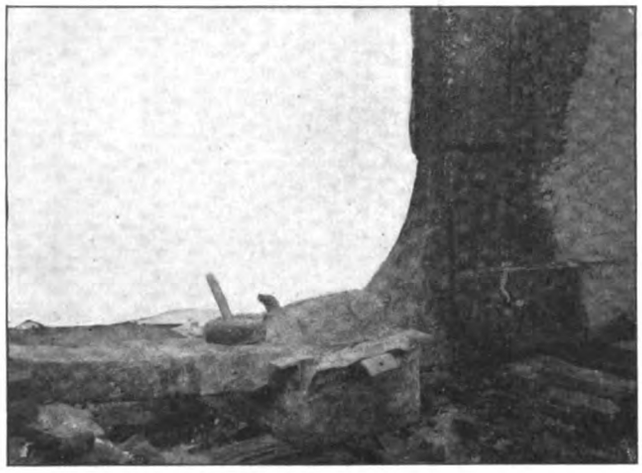
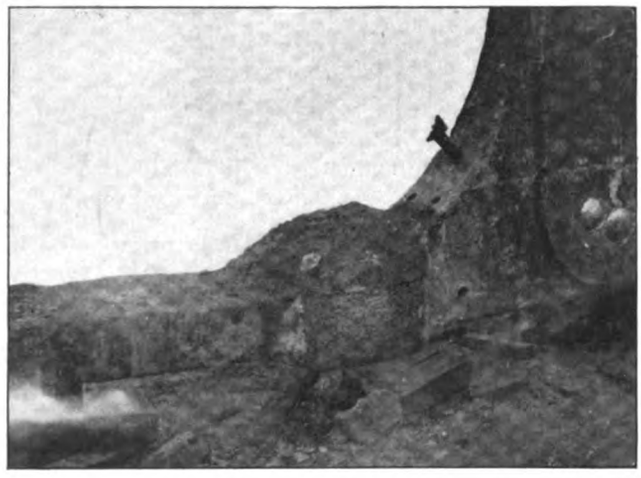
skeg. It was decided to have an aperture of clearance in the break for the metal to flow through, and as it was impossible to spread the broken parts, a series of holes 1 in. in diameter were drilled vertically through the skeg, nine in number, following the line of the crack. The section to be welded measured 6¾ in. vertically, by 11 in. horizontally. The men



THERMIT WELD. TOP HALF MOLD BOX REMOVED.

with air drills were started to drill these holes as soon as the patches were removed, and as this work would take them long into the night, after darkness set in, nothing further was done on the work the first day. Arrangements were made to have the mold and mold box, which had been previously prepared, put into a furnace at about 6:30 p. m., and they were to be left in the furnace until the following morn-

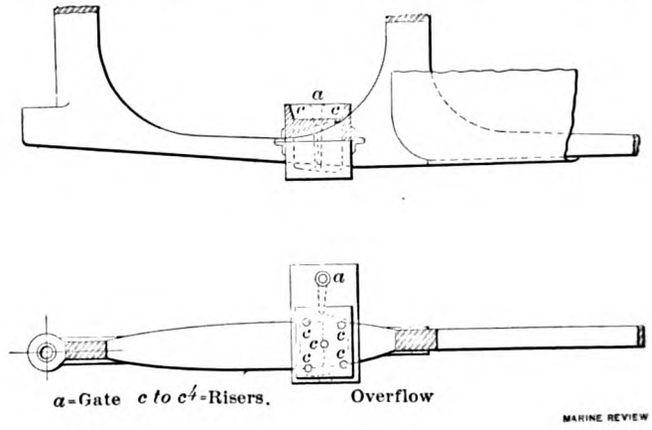


COMPLETE WELD OF THE SKEG.

ing. It will be understood that the mold had been one week in preparation and drying, and the final heating was to be applied, as described. The skeg was then heated to a red heat and the mold box taken from the furnace and put in place. A foundation was built under the mold box, and a riser of brick, forming a base with a wall about one brick wide and about 12 in. high, was formed around the mold box, forming a basin, as it were, into which moist sand was poured. The joints were well looted and sand well packed up around the looting, so that the entire mold was thoroughly protected in case of any leaks. The mold had been so arranged, as the section to be welded was very broad (11 in.) it was thought best to have it well ventilated, and five risers were prepared, the riser box being very shallow, with a spout for the slag to run off, and a trough in the sand leading to a pit which was formed at one side, over which was a cover of sheet iron to protect the operators from the heat.

A small open furnace had been prepared and placed on top of the mold, in which a charcoal fire was burnt. Air from their compressed air supply on the dock was utilized for draft, and hot gas was forced down through the gate and up through the riser. While this was in progress, the crucible was put in place, the ordinary tripod being used. There were placed in the crucible 475 lbs. of Thermit, together with 100 lbs. of steel punchings (the punchings in the crucible having previously been heated). Ten pounds of manganese were mixed into the Thermit. The mixture of the Thermit, punchings and manganese was performed by pouring in each consecutively, each being well stirred as they were placed in the crucible.

Owing to the pre-heating, the final reaction was retarded until 4:35 p. m., when the Thermit was ignited and the reaction took place. The slag, though precautions had been taken to contain it within walls and canals, overflowed its bounds in the gate, causing some little difficulty for a few minutes; this portion of the slag was covered with sand. Thermit was then used in feeding to the risers and gate, feeding in gradually, maintaining continuous reaction for several minutes to relieve the mold of gases which might form in the body of the weld. This proved to be very effective, as much gas was seen to come from the mold through



MOLD AND MOLD BOX.

the riser and gate during the feeding process. This was continued until 50 lbs. had been consumed.

The mold was allowed to remain in place over night, gradually cooling, and was then annealed by surrounding the weld with a box, into which charcoal fire was prepared. This fire was continued about five or six hours, allowing the weld to gradually cool. In the morning when the mold boxes were removed, the gate and risers were trimmed off, and the grain of the metal appeared to be of exceptionally good quality, and cut very freely with the air tools. The shaft and propeller wheel were then put in place, and the vessel was ready for docking by 10 a. m. of the third day.

In this work a No. 10 crucible was used, with the ordinary sheet iron cover with an asbestos lining. After the reaction in the crucible the cover, etc., were in good condition, and may be used for possibly several reactions yet. The sheet iron stand which formed part of the crucible was partially melted off, but does not affect the strength of the crucible, as another stand can be easily applied.

The two ferryboats which were burned at the D. L. & W. terminal fire the week before last are at Tietjen & Lang's drydock for repairs. The Binghamton is having its entire upper deck rebuilt and the end of one of the lower decks. The Hopatcong is in very bad shape, being burned clear down to the steel hull, and it is a question whether it will be worth repairing it. They have not decided what they are going to do with it yet.

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TURBINES FOR OCEAN LINERS

Prof. Biles, who is so well known for the interest he takes in the turbine development, and also as the designer of the Midland Railway Co.'s Heysham steamers, has contributed a paper on "Turbines for Ocean Liners" to the proceedings of the Engineering Section of the British Association at Cape Town. Pressure of business engagements prevented Prof. Biles' attendance at the meetings in South Africa, and the paper was read for him on Aug. 16.

Prof. Biles says that when he agreed to give a paper on this subject it was hoped that detailed results of the running of the only two complete turbine ocean liners would have been available. The owners and builders of these steamers readily promised such information, but the preliminary difficulties inherent in such a radical departure had taken more time to overcome than some expected, and the results obtained had not been as good as they would be, and were therefore not worth publishing. It might, however, be stated that the results completely justified the adoption of the turbines in ocean liners, and that Mr. Parsons' annexation of the whole field of high speed marine propulsion, from the small type of torpedo boat to the Atlantic greyhound, was now complete. It was possible that they had seen the last of reciprocating engines for the main propulsion of warships. Such a revolution in the type of machinery had never before been seen. Such a great change had certainly never taken place in so short a time. After indicating the extent of the marine turbine's development, Prof. Biles said that the cross-channel steamer class had given an excellent opportunity for developing the new system of propulsion, because the work was thoroughly practical, while the vessels were constantly at work, under observation of the managing staff. They could be readily laid off for the examination and adjustment, which were so much more necessary in the developing stage than at a later one. Two sets of results were available for this class. The first were those of the Queen, the first cross-channel steamer fitted with turbines; the second, those of the Londonderry and Manxman, designed by himself and his partner, Mr. William Gray. The first results he tabulated as follows:

	Dimensions	Coal per H. P.	Per Passenger certified to be carried				Speed
			Coal Burnt	No. of E. R. Staff	Oil Used	Cost of Coal E. R. Staff	
Queen	323 x 43	1.00	1.00	1.00	1.00	1.00	21.00
B	324 x 35	1.43	1.74	2.03	2.97	1.8	18.00
C	280 x 35	1.25	1.25	1.47	2.47	1.34	18.50
D	313 x 36	1.9	2.07	1.73	2.69	2.06	17.50

The first column gave the engineering efficiency, from which it would be seen that the gain over the best of the old type was in ratio of 5 to 4. The commercial and engineering efficiency combined were given in the other columns, and the results were very striking. All the gain might not be due to the turbines; some might be due to the increased efficiency in passenger carrying in the Queen; but this could not be very great. It seemed as if, comparatively, the net gain in commercial efficiency was higher than that in engineering efficiency alone. The results of the running of the turbine steamers Londonderry and Manxman were, from an engineering point of view, equally interesting. These two vessels were of exactly the same form as the vessels Antrim and Donegal, designed at the same time by himself. They were for the same service, and the two latter had reciprocating engines. The latter vessels were identical, and it was thought that they were highly efficient representatives of their class. The two former differed only in the matter of turbines. The Londonderry had turbine power sufficient to obtain the same speed as the vessels with reciprocating engines. The weight of the machinery was less, and the saving in the weight reduced the displacement and the resistance of the vessel so that the power for the desired speed was less. This advantage to the turbine showed in its first cost as well as in the cost of running, and it left the comparison with the reciprocating engine as one which included in favor of the turbine the incidental advantage due to its light weight. One of the savings in weight in the Londonderry was in the boilers, which, though of the same size and number as the other vessels had a reduced pressure of 150 lbs. instead of 200 lbs. In the case of the other turbine vessel, the Manxman, the same saving in weight was not made, but a more powerful turbine was put in, and the boiler pressure was not reduced as in the Londonderry. By this arrangement, the greatest power which the boilers could give was obtained, regardless of the weight of the turbine, instead of, as in the other case, the smallest weight for a given power. The net result was a maximum in speed of three-quarters of a knot, which, if the efficiency in the other two ships were the same, was the equivalent of a gain of 14 percent of power when the extra resistance due to the extra weight was allowed for. It was difficult to determine how much of this gain was due to the turbines, as the propellers were different in the three ships, and probably had different efficiencies. But from steam consumption observations, it appeared that at about the maximum speed of 22 knots of the Londonderry, the slower vessel, the extra power required was more, while the resistance was less, the net difference in efficiency of turbine and propeller being at least 12 percent in favor of the Manxman, the faster vessel. If this gain in efficiency was maintained throughout to the full development of Manxman's power, there would only be a net increase of power developed in the turbine of less than 2 percent. It was difficult to say whether the efficiency would or would not be maintained, and so one was left in doubt as to the relative efficiency of the larger turbines with the higher pressure, though it seemed probable that it was represented by a small percentage above 2 percent. As to the comparison between the turbines and the reciprocating engines and propellers combined, their comparative efficiencies were at 20 knots speed in the following ratios: Antrim, .97; Londonderry, 1.0, and Manxman, 1.11. The results on service were more interesting commercially. It was difficult to eliminate effects of weather, tide, loading of vessels, and the other matters which affected results on service, but a fair average could be obtained if sufficient observations were taken. The method of comparison adopted was to find from the logs all the voyages in which two chosen ships were running on the same night in opposite directions omitting from these all cases in which full speed was not maintained in the open sea for all the run, the following results were obtained:

R—Reciprocating T—Turbine	Antrim R.	Lon T.	Lon T.	Don R.	Don R.	Man T.	Man T.	Antrim R.
No. of Trips	48	48	42	42	39	39	29	29
Average coal per trip	35.6	35.3	36.9	36.0	28.7	40.2	38.6	38.6
Av'ge speed in knots	19.7	19.5	19.8	19.2	19.3	20.3	20.3	19.5
Speed[2] Coal consumed	10.9	10.76	10.62	10.24	5.59	10.25	10.67	9.85
Coal consumed per cent. in favor of	1.30	—	3.6	—	—	6.6	8.2	—
	Londonderry				Manxman			
Mean per cent. in favor of turbines	2.4				7.7			

This method of measuring efficiency by the ratio of the square of the speed to the coal consumed, assumed that resistance varied as the square of the speed. If the actual water consumption curves were used, the results at the same

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speed gave an average advantage of the Manxman over the two reciprocating engine vessels of 8.9 percent. The advantage of the Londonderry over the Antrim on trial was 3 percent, but it changed to a disadvantage of 1.3 percent on service, making the Antrim 4.3 percent better on service relatively to the Londonderry than she was on trial. The similar figures of the Antrim and Manxman showed the latter 14 percent better on trial, but 8.2 percent on service, a gain for the Antrim of 5.8 percent as between trial and service conditions. The efficiency on service, therefore, seemed to be less marked in the turbine than it was on trial. It might be that with the increase of resistance due to sea wind and foul bottom, the turbine propellers were less efficient relatively as they were so small, but it was reported that in bad weather there was less racing in the turbines. Until they had careful water consumption tests systematically carried out, the point would remain doubtful. It seemed certain, however, that eight or nine percent of gain might be relied upon if the turbines were as efficient as those of the Manxman. The weight of the Manxman's machinery, and the part of the hull lightened, turned out to be 115 tons less than the Antrim, a saving of 15 percent in the total weight of engines and boilers, etc. With reference to warship machinery the professor said the British admiralty built four vessels of the same form and dimensions. Into one they put turbines, and into the others reciprocating engines. The vessels' dimensions were 360 by 40 by 14 ft. 6 in. draught; displacement, 3,000 tons. The reciprocating engines developed 10,000 I. H. P. and the vessels attained a speed of 22.1 knots. The turbine vessel attained a speed of 23.6 knots. Water consumption trials gave at 22.1 knots 215,000 lbs. per hour in the reciprocating engines, against 190,000 lbs. at 23.6 knots in the turbine. The difference in speed of 1½ knots at the same efficiency of propellers represented about 20 percent difference of power, and one would expect to find the same difference in water consumption. This would increase the 190,000 to about 230,000 lbs., as against the 215,000 actually used in the turbine. This showed a gain in favor of the turbine of 7 percent. Here again they had only the combined relative efficiency of turbine and propeller, but if the small propeller was inefficient it was a necessity of the turbine, and if it was more efficient than the large propeller it might be taken as an incidental advantage of the turbine. The former was probably the truth. Four 2,170-ton turbine vessels of dimensions 275 by 44 by 16.6 had been built and were running for the British India company from the Persian Gulf to India, having speed of 18 knots, which involved about 6,000 H. P. A vessel of 2,448 tons, of dimensions 300 by 43 by 25, named the Loongana, for the Union company of New Zealand, having a speed of 20 knots and about 6,000 H. P. on trial, had steamed from Scotland to New Zealand and was there successfully running. Proceeding to discuss ocean turbines Prof. Biles gave particulars of the Allan line Virginian. Her displacement on trial was, he said, about 13,000 tons, her speed on trial 19½ knots, and the revolutions of her propellers 285. She had nine boilers 17 ft. diameter by 12 ft. length. Her steam pressure was 180 lbs., heating surface 30,800 square feet, and grate surface 726 square feet. The use of the turbines enabled her to carry 60 more passengers, and there was a saving in the weight of machinery of 400 tons. Her mean speed across the Atlantic was 17 knots, and the coal consumption was practically the same as for triple expansion engines of the most modern type. There was no doubt that when a proper adjustment of form, area and pitch of propeller to the boiler power and the form of the ship had been reached in these ships the turbine system would prove an advance upon, and indeed supercede, the reciprocating engine for vessels of this class. The best results obtained had not yet been as good as the steamers were capable of, and therefore there was no possibility of saying anything more definite as to the efficiency of turbines in ocean liners at present than that they had justified their adoption. There would be at some time not very remote he was convinced turbine ocean liners on all the routes. Today it might be said there was every indication that in the largest installations an economy of power and cost was assured, as it had been in the Channel steamers. There seemed little doubt that the turbine would completely displace the reciprocating engine in all moderate and high speed lines.

AS BUFFALO VIEWS THE CHANGE

Buffalo, Sept. 5.—It seems too bad that perfectly correct theory should be capable of either making a bad showing on its own account or capable of being made the fabric for supporting the very worst sort of superstructure. Still it is not best to drop a good thing because it has such possibilities, any more than it is best to go out of the poultry business because eggs are about the easiest to spoil of anything going. That is the way we shall have to deal with the many new and large things in the business world. And to begin with we ought to make little account of the minor and individual changes they bring about.

I go down to the foot of Main street now, when I do at all, mainly to take another look at a ruin. Up to within the few wonderful years that have been used to mark the present century that was a sort of charmed spot for marine men. Not a captain on the lakes but liked to spend his spare time down there, either in the tug offices, or in the brokers' offices, while they lasted, not to mention the many steamer lines that centered there. There were once five or six of the latter on a single street corner, but only one now. If the others were to be sought for a few would be found in fine offices up town, scattered aimlessly here and there, some under new names, some, alas! not to be found under any name. They were swallowed up by the growth of things marine.

The brokers one by one fled up town and the only tug office left is so far from the foot of the street that it owes nothing to the locality. The block that held such offices and marine people of all sorts to overflowing once now knows very little of that sort of people and is a mere makeshift for chance occupants. On the other side of the street wonderful Central wharf, the mere mention of which sends a thrill of fond recollection through the soul of any old marine man of the days olden and some days not so very olden, Central wharf, the bee hive of everything marine, where one could see the lake fleet coming and going from the upper floors, has long been merely the place for rushing package freight up an inclined railroad platform for dumping into a freight car. Nobody goes there but people in that line.

There is no longer any sort of rallying place for marine men in the port. I sometimes wonder how the captains, yes, and still larger vessel men, manage to relieve themselves of the many stories and much chaff that must be accumulating in their anatomies in these sordid humdrum days of mere business. I sometimes think that some of them, like the Dutchman who must talk or bust, must be so filled up with recollections that they are feeling very uncomfortable. Of course they do meet now and then in some single broker's office up town and they have their clubs and their special chums when ashore, but the actual contact with the business, as it used to be afforded "on the dock," is lost and most of the flavor has gone with it.

Well I recall an occasion that illustrates what I am try-

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ing to picture. It was a great day in that line, for the port was paid a visit by no less notable up-lake men than W. H. Wolf and Fred Pabst of Milwaukee and I think one or two more with them. Anybody who ever saw Capt. Wolf half an hour in his life knows what such a visit meant. The party took chairs down at the foot of the street—it was the day still, I think, before a vandal railroad had yet torn down the shed over the dock—and soon the yarns and fun without end that the Wisconsin city's leading ship builder and owner was master of, gathered about him all the frequenters of the quarter. He held veritable court on the open wharf as long as he chose to stay and his stories went the rounds long after he went home again.

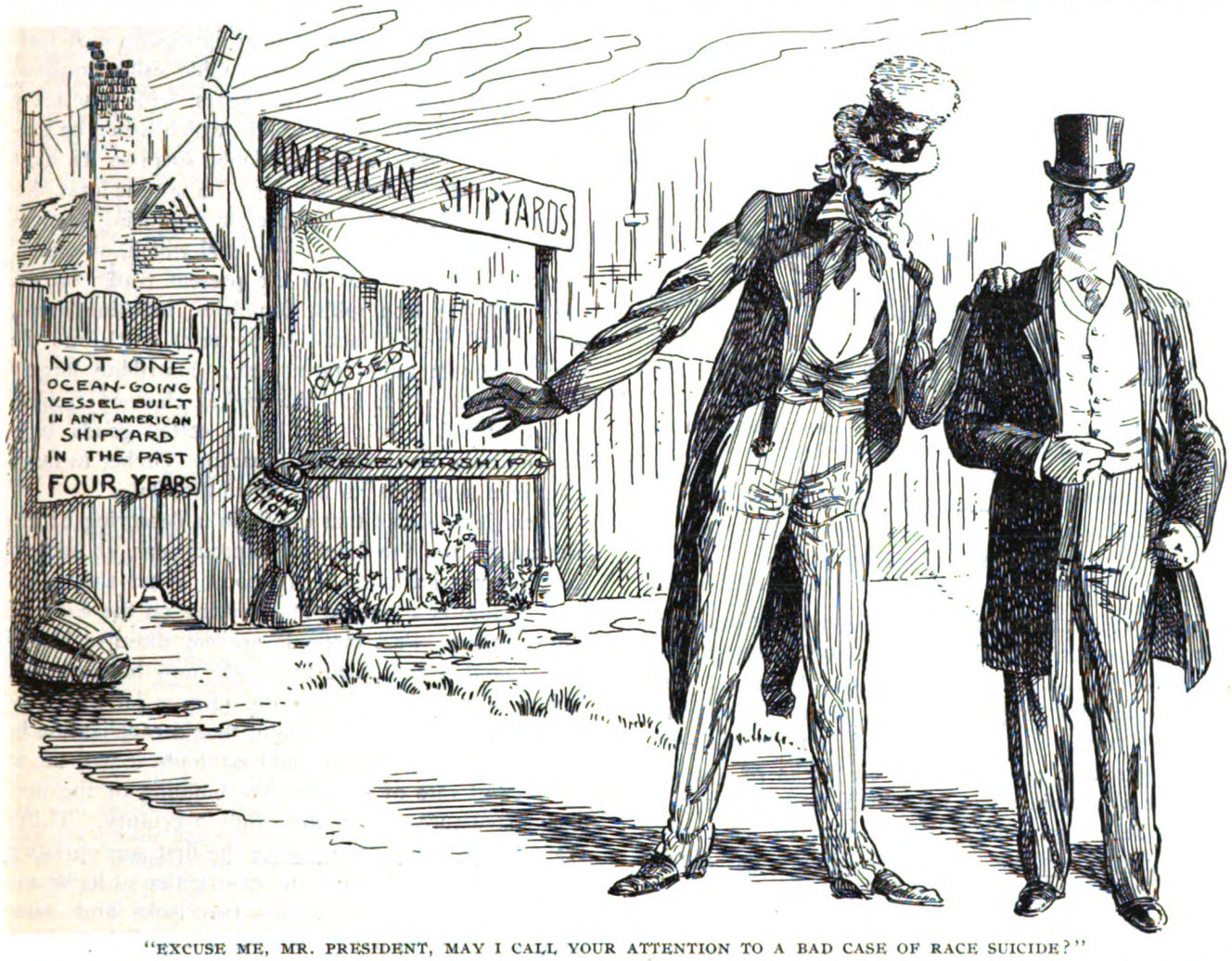
The recollections of these now almost forgotten days, mere incidents in the line of speculation of recent marine progress I had set out to study for a moment, have almost driven out the main point, and that is that while we have become of late much more earnest, practical and successful in all sorts of business, marine with the rest, than we used to be, we have been obliged to toss aside a great many things that were called good in their day to make room for the host of innovations necessary to the change. It sometimes happens that in order to do this there are overreachings and excesses that make it seem as though the effort was not worth the while or was a menace to the community in some way.

Well, it would be hard to suggest a system of larger business combination, such as this country certainly needed, without such things. Some people see in them the beginning of the ruin of our liberties and the loss of our individualism, but it was inevitable and we must seek to regulate, not break it down by regulations. What is government but combination? What is socialism, but the ideal combination? They are now talking of combining all governments by a general congress, a combination greater than all others, but a good thing none the less.

We are sorry that progress has so little respect for traditions and customs, but it seems inevitable.

JOHN CHAMBERLIN.

The officers of the United States Revenue cutter Perry, which reached Juneau, Alaska, after a cruise of two months to the most westerly of the Aleutian Islands, report that the natives on Atka and Attu islands are destitute, their only food being fish, and their supply of clothing exhausted. Disease is rapidly destroying them, only about seventy-five members of the Attu tribe remaining. Seven boxes of clothing provided by the National Ladies' Aid Society were delivered. The cutter found four Japanese vessels in the harbors of islands on which salting stations had been established. The fishermen's camps were burned and orders to depart were issued to the vessels. Colonel H. Kutcheon, United States fish expert, says that the Japanese do a great deal of illegal fishing, and he will recommend that a revenue cutter be stationed at the Aleutian islands to protect American fisheries.



"EXCUSE ME, MR. PRESIDENT, MAY I CALL YOUR ATTENTION TO A BAD CASE OF RACE SUICIDE?"

The Bowers Southern Dredging Co. recently launched at Orange, Texas, a wooden dredge for work in Galveston harbor. Machinery will be installed in her at the company's plant in Galveston.

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The accident summary of the Interstate Commerce Commission for 1904 shows that 10,046 persons were killed on the railways of the United States last year. This is an appalling record, but prominence should be given to the fact that 5,105 of this number were trespassers who were walking on tracks or stealing rides or performing acts for which the railways cannot be held responsible. The number of passengers actually killed as the result of collisions and derailments was 262 out of this total of 10,046. The report says that only one passenger out of every 1,622,267 carried was killed either by train accidents or any other mischance, such as falling from cars. Out of the total of 715,419,682 passengers carried a distance of 21,923,213,536 miles, only 441 met death from any cause whatever.

In the current number of the *Engineering Magazine*, Mr. John F. Wallace, formerly chief engineer of the Panama canal, has an article introductory of a series of forthcoming articles upon the Panama canal as a problem. It is quite evident from the introduction that Mr. Wallace has something to say, and the articles will doubtless be watched and read with great interest by the engineering profession of the world. Mr. Wallace spent a year of study upon the Panama canal question and then tendered his resignation as chief engineer. This resignation was received with so much indignation by Secretary of War Taft, that Mr. Wallace was practically given no opportunity to state his reasons for resigning. The forthcoming articles will doubtless contain them.

Since the passage of the last river and harbor act the Ohio river has been much in evidence; and well it should be, for it is one of our most important internal waterways, especially when considered with its tributaries. It is to be regretted that no reliable statistics of the freight handled on this river are available, for nothing is more convincing than figures in such matters. Should the progress of the Ohio valley continue as it has during the past few years, with practically continuous navigation, the freight which would be handled on the Ohio would no doubt surprise its most blind advocate for improvement. To say the least, this valley is one of the greatest freight-producing sections of the United States. Not only coal which, of course, forms the greater part of the present traffic on the river, but the iron mills, foundries, machine shops, bridge works, glass factories, potteries, brick and tile works, cement mills, farms, etc., contribute largely to the tonnage; so, too, the higher class of freight, such as clothing, boots and shoes, cotton goods, buggies, harness, furniture and tobacco. Timber in large quantities also finds its way down the Ohio.

There is no doubt that the Ohio is deserving of improvement, and the form of improvement, at least in part, is practically decided upon. What they need on the Ohio is a method for carrying on the work of improvement. Past methods are not those to be indorsed, and if continued the works now building will be in a state of decay before the purpose for which intended will be realized. Again, should canalization be the form of improvement, and no doubt it will be, at the present rate of progress the building of the necessary structures will require fully a century. Thirty years have already passed since the first appropriation was made looking toward the construction of locks and dams, and with what result—two locks and dams completed. Perhaps in two years more the stretch of river between Pittsburg and just below Beaver will be provided with locks and dams—about thirty miles in almost one thousand.

However, it appears from the last river and harbor act that Congress intends taking decisive action in this improvement. The present half-hearted method will no doubt be abandoned. Should Congress decide to give the Ohio river the improvement it deserves, the method of carrying out the plan must be put on a business basis.

Railroads are not built by dividing the territory to be traversed into sections and constructing each section as the man in local charge thinks advisable. That

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is practically the method now employed on the Ohio. Can it bring results? This is perhaps the only river under improvement which is so divided—the improvement of the Mississippi being in charge of a commission. To properly improve the Ohio will require for a number of years appropriations equal to or greater than those usually made for the Mississippi, and a commission would be the proper executive.

Not a commission as that in charge of the Mississippi river improvement, but a board of engineer officers formed of those officers in charge of works directly connected with the Ohio and its tributaries. This would insure a uniformity in the structures, a thing to be hoped for, as it would undoubtedly lessen the cost of maintenance and may prove a saving in the first cost. It would, of course, reduce the number of civilian engineers, draftsmen, and clerks required during construction. It would insure the study of the river, together with its tributaries as a whole, which would result in much benefit in planning the work. Perhaps the greatest benefit which would be derived from having the work under one head is the hurrying of the improvement to completion.

With an officer of experience as chairman, centrally located, all plans could be prepared in the central office and all work directed from that point; the actual construction work being in local charge of members of the board would receive greater attention.

FREIGHT SITUATION

Ore carriers are receiving good dispatch at upper lake ports. Shippers report that the docks are in better shape than they have been for some weeks past, and that ore is coming forward freely from the mines that were recently flooded. Trade is being easily handled by contract vessels, however, and there is little wild chartering. Steamers are moving from upper lake ports with more than customary dispatch at present with the result that Lake Erie docks are likely to be crowded the latter part of the present week. There is no reason to believe that the total ore movement for the year will be less than 31,000,000 tons.

Coal is moving freely but not in sufficient quantity to make wild chartering active.

The grain trade has not been at all attractive during the season, but prospects are brightening now. Some tonnage has been placed at 2¼ cents from the head of the lakes to Buffalo for October delivery, and it is likely that a few of the modern vessels will gravitate to this trade after the middle of October.

LAUNCH OF CAR FERRY

The twin screw car ferry Bessemer & Marquette No. 2, building at the Cleveland yard of the American Ship Building Co., for the Marquette & Bessemer Dock & Navigation Co., was launched on Tuesday afternoon of this week. The car ferry was christened by Miss Mildred E. Hammon, of Pittsburg, daughter of Mr. O. H. Hammon, general freight agent of the Bessemer & Lake Erie railroad. Miss Hammon was accompanied by her father and mother, Mr. and Mrs. H. B. Hammon, of Warren, O.; Mr. James C. Wallace, Mr. Russel C. Wetmore, Mr. Robert Logan, Mr. W. F. Herman, Miss Herman and a number of men identified with the railroad. The new car ferry will be operated between Conneaut, Port Stanley and Port Dover, and will carry thirty cars. The steamer is 350 ft. over all, 338 ft. keel, 54 ft. beam and 36 ft. deep and is equipped with triple-expansion engines with cylinders 19, 31 and 52-in. diameters by 30-in. stroke. Steam will be furnished by four Scotch boilers 13 ft. 9 in. diameter and 12 ft. long, allowed 175 lbs. pressure. She will carry thirty loaded cars on 14 ft. of water, and is designed for a speed of 14 miles.

STANTON TO BE LAUNCHED SATURDAY

The steamer John Stanton, building at the Lorain yard of the American Ship Building Co. for Capt. Charles Hutchinson, of Cleveland, will be launched on Saturday morning next. She was promised for 1906 delivery, but will come out this season and will be ready to go into commission by Oct. 15. The Stanton is 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. Her hull is of arch construction with straight hopper for cargo. She will have thirty hatches spaced 5 ft. centers. She will be equipped with triple-expansion engines, 23½, 38 and 63 in. cylinder diameters by 42 in. stroke, supplied with steam from two Scotch boilers 14 ft. 6 in. diameter by 11 ft. 6 in. long, equipped with Ellis & Eaves draft and allowed a pressure of 180 lbs. She will carry 9,000 tons of ore. The Stanton was the first steamer to be ordered this year. The ship building company has made unusually good progress upon her. Mr. John Stanton, in whose honor the steamer will be named, is a pioneer in the Lake Superior copper trade.

WILL BUILD DREDGES

Duluth, Minn., Sept. 11.—The Duluth-Superior Dredging Co. has let contracts to N. Grignon for the construction of its fleet of boats, and he has leased a yard from the Northern Pacific at the foot of Sixth avenue, this city, and begun work. He is to build at once three large machines, two of them to be 10-yard dippers and one a 20-in. hydraulic, to be among the largest and probably the most powerful on the lakes. The dipper dredge hulls will be 130 x 44 x 14 ft. All are to be completed by spring, and will enter the lake dredging competition at that time. About 140 men will be employed at the yard and already a lot of material has arrived. The dippers will have Bucyrus dippers. This company is composed of several members of the old Duluth Dredge & Dock Co., which sold out at a very high price not long ago, and of R. B. Knox and N. Grignon, of this city. Mr. Knox is brother of the vice president and general manager of the Bucyrus company, and it is generally supposed that that concern is interested in the venture. There is ample capital and the company will be thoroughly equipped with machines, tugs and scows. Four large dumping scows, of from 800 to 1,000 yards capacity, will be built. Three tugs will either be bought or built.

The LaCrosse Dredging Co. is building a sand-sucker for its work on the filling of the Northern Coal & Dock Co. at Superior, and will have it in operation in a short time.

It is reported that the Lake Superior Dredging & Contracting Co., which is the old E. T. Williams & Co. outfit and a number of other machines in combination, is to build several modern dredges during the coming winter. This company has a number of outfits scattered from Texas City, Texas, to the northern end of Lake Superior.

The steamer Wm. Livingstone, bound down the river at Cleveland, was struck by the Main street bridge, as she passed through the draw. As a result Wm. Lee, a fireman on the boat, was badly scalded. Traffic across the bridge was delayed for hours. The steamer lost her smoke stack, her boiler house was badly stove in and the steam connections to her boiler were broken.

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LIVERPOOL SHIPPING LETTER

Liverpool, Sept. 4.—The conclusion of the war in the far East has caused some talk in Liverpool shipping circles about the likelihood of the chartering of ships to transport the Russian and Japanese troops back from the seat of war. The idea, gathered from an influential source, seems to be that a considerable amount of transportation tonnage will be required, but up to now there is no tangible evidence either of Russian or Japanese inquiries, though it is believed that several ship owners of this port have taken the matter up and made proposals to both governments concerned. It is estimated that the Russians have at least 700,000 at the front, while Japan's total cannot be much less than a million. What might the United States be able to do at this moment did she possess the ships? Here is an opening for a great deal of tonnage that has been lying idle in Britain for some time past, and it is safe to say that British shipping will boom for a brief period at all events. But Japan has already doubtless got an eye on the permanent shipping services which may be expected from trade developments in the East as a result of the war now happily ended.

The casualties to vessels of 500 tons gross register and upwards which have been posted in the Liverpool Underwriters' Loss Book during August include total losses as follows: British, sail 2, steam 2, of 3,241 and 4,833 tons respectively, as against four of each in the corresponding month of last year. Foreign owned numbered 11 sail and 7 steam, the aggregate tonnage respectively being 13,219 and 12,716 tons, as against 3 sail and 8 steam in August, 1904. The grand total of tonnage totally lost during August was 34,009 tons, against 23,964 tons in August last year. The total and partial losses for last month numbered 350, as against 386 for the corresponding period of 1904, 392 for 1903, and 304 for 1902. The nature of casualty is given as follows: Weather damage, 36; founderings and abandonments, 4; strandings, 110; collisions, 108; fires and explosions, 32; missing, 1; damage to machinery, shafts and propellers, 47; and other causes, 12.

The new all-British steamship service from Southampton to New York via the West Indies which is to be inaugurated by the Royal Mail Steam Packet Co., will be opened by the steamship Tagus, which will leave Southampton on Sept. 30. The service is one which was formerly maintained by the company, but ceased about twelve years ago, and the present step has been taken in consequence of the lapse of the company's contract with the government to carry mails, and the removal of restrictions as to itinerary. The new service will provide communication between Southampton, Jamaica and New York in twelve days, and passengers will be able to avoid the rigors of the North Atlantic passage during the winter months, and travel through sunny seas during the whole journey. The change will involve alteration of the day of sailing from Southampton from Friday to Saturday.

A change is taking place, rapidly and without startling anybody, which will do as much for the British navy of the future as the substitution of steam for sails did in the early half of the last century. Hitherto all the faith of engineers has been pinned to the piston engine, in which the steam has jerked a rod to and fro, and thus set up a motion which is communicated to wheels and cranks, and so provides the driving force. The engineers are now being quickly converted to a system by which the steam blows onto a series of fans in a box, causing them to turn with the shaft on which they are set. In other words we are witnessing some rapid developments in the general adoption of the turbine engine. The British admiralty has just ordered twelve new torpedo boat destroyers, all of which will have turbine engines, thus showing that they are convinced of the virtues of the modern system, and, if further proof were needed of the success of turbines, one need only point to the good record of the cruiser Amethyst, which has shown that the fan in the box arrangement is quite as effective in the warship as it is in the Channel steamer and the swift ocean liner. Another striking fact is that the largest British warship ever designed, the battleship Dreadnought, is to be driven by turbines. Her boilers will have extra high pressure, and well they might, for the 18,000 tons which the Dreadnought will weigh will have to be flung through the sea at a speed of over 20 knots—that is, over 23 miles an hour. Here there is plain evidence of the importance of the change in the method of propelling our warships, and it is a change which most of the engineers of the navy greet with enthusiasm. The latest inquiry as to turbine steamers emanates from the Great Central Railway Co., who are now inviting tenders from shipbuilders for two steamers to be turbine propelled. The proposed turbines are intended to prove a valuable addition to the company's sea service when they take up their running.

The German turbine cruiser Lubeck does not appear to have done so well as was expected with her four shafts and eight propellers. The speed attained was no greater than that of her sister ships Hamburg and Bremen, which are fitted with reciprocating engines, while the consumption of coal was greater up to 16 knots. It is stated that the turbine engines required less oil for lubrication than the reciprocating engines, and that this would in some degree be a compensation for her greater coal consumption at moderate speeds and lower powers. But this can hardly be a "quid pro quo." The saving in oil would go but a small way to balance the extra coal bill, unless the saving is very great. The coal consumption per horse power rose with the increase of power in this ship, whereas it is the almost universal experience in this country that it falls considerably as the power increases. Thus at 20.5 knots with 7,600 H. P. the coal consumption was 1,929 lb. per horse power per hour; but with a speed of 21.5 knots and 9,500 H. P. it rose again to 2,149 lb. In the British cruiser Amethyst, the economy of fuel was progressive from 14 knots up to full power, when she completely distanced her sister ships Diamond and Topaz both in speed, power, and economy of fuel.

The launch of the new Hamburg-American liner Kaiserin Augusta Victoria on Tuesday, Aug. 29, marks an interesting development in the shipbuilding records of Germany, as this vessel will be the largest constructed in the Fatherland, and marks one further success in the history of the Vulcan works at Stettin, where the four fastest Atlantic liners had their origin. The new ship, however, is not destined for high speed, belonging as she does to the intermediate class, which is steadily gaining in popular favor. The new vessel will combine a very considerable cargo-carrying capacity with extensive accommodation for passengers, so that when laden she will have the enormous displacement of 35,000 tons, and with the twin-screw engines developing 17,500 H. P., will have a speed of 17 knots. The accommodation provided is for 532 first class, 301 second class, 218 third class, and 2,268 steerage, making a total of 3,319 in all. This is exclusive of a crew of some 600 officers and men. Many interesting features are being introduced in this new ship, including a series of hoists through the various decks, of which there will be eight, while special facilities are being arranged in connection with the cuisine, including a restaurant, where meals will be served "a la carte," passengers having the option of booking their fare exclusive of payment for food. There will also be increased facilities for physical exercises and recreation. The vessel has a length between perpendiculars of 699 ft., a beam of 77 ft., a depth from the boat deck to the keel of 87 ft., the tonnage being 25,500 tons.

The Scottish shipbuilding figures for August present sev-

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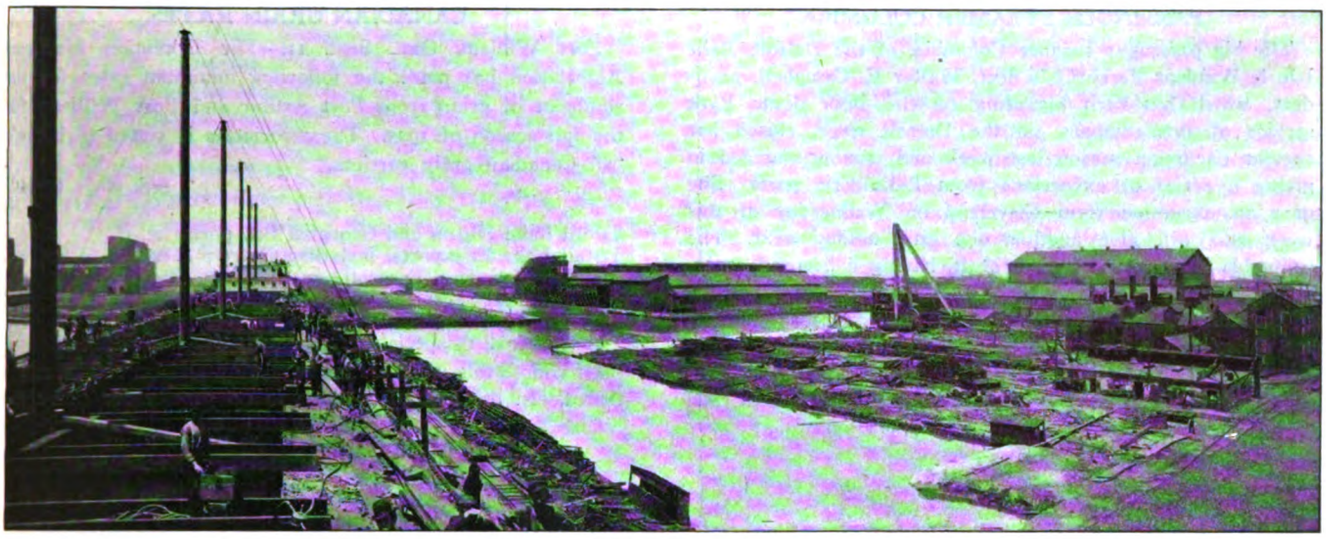

YARD OF THE CHICAGO SHIP BUILDING CO. AT SOUTH CHICAGO.

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eral interesting features. In the first place the output is large, 30 vessels of 62,042 tons, of which 23 vessels of 58,055 tons were launched by Clyde yards. This is much higher than the monthly average, and it brings the eight months' Clyde total up to 314,182 tons, the highest on record with the exception of that of 1901, when the eight months produced 330,126 tons. Another feature of the output is the large tonnage floated for Clyde owners. This runs up to over 30,000 tons, composed almost wholly of cargo steamers, of which seven were launched for local firms ranging in size from 5,100 tons gross to 3,900 tons. As to new work the total for the month is about 42,500 tons.

Anent the renewal for five years of the contract with the Allan line for the carriage of the mails between Great Britain and Canada, it is interesting to note that, with the exception of a short interval, the Canadian mails have been carried by the Allan steamers for upwards of half a century. In fact, in 1852, the Dominion government realizing that the development of British North America demanded the provision of a line of high class steamships, entered into a contract with Messrs. Allan for the running of mail steamers between Liverpool and Canada. The first craft built for these subsidized duties were very small compared with the Victorian and Virginian of today, being only about 1,500 tons gross, but they then represented the latest improvements in shipbuilding, and were justly regarded as large, strong vessels, with excellent passenger accommodation. Since 1852 the history of the Allan line has been one of steady progress, and, as might be imagined, the mails carried have increased in enormous proportions in the intervening fifty years. In recent times the parcel post has been added, and now, apart from the large number of bags of mail, hundreds of the parcel post baskets are shipped to and from the Dominion. Messrs. Allan tendered for a ten years' contract, and the fact that the shorter period has been decided upon has given rise to some comment on the part of an Ottawa correspondent, but it may be mentioned that five years is a longer period than has been agreed upon for some time, the last Allan contract only having been for two years.

The new steel ferry, which is under construction by the W. & A. Fletcher Co., Hoboken, N. J., for the West Shore railroad, was launched last week at the yard of the T. S. Marvel Co., Newburg, N. Y. The new ferry boat will practically be a duplicate of the West Point and Syracuse. She will be 208 ft. long, 66 ft. beam over guards and 18 ft. deep.

VESSEL LOSSES FROM STORM AND COLLISION

Since the opening of navigation eleven vessels in the ore trade have been lost through storms and collisions. These vessels are the Sevona of 4,500 gross tons, the Pretoria of 5,100, the Olive Jeanette of 2,443, Iosco of 3,000, Etruria of 6,250, Hesper of 3,000, Thomas W. Palmer of 3,100, Yakima of 3,000, Linden of 1,450 George V. Presley of 2,800 and the John M. Hutchinson of 1,900, a total of 36,543 gross tons. In a full season of twenty weeks these vessels would have a total carrying capacity of 730,860 gross tons, so that figure is to be regarded as this season's subtraction so far from the available ore carrying fleet. Four of these vessels succumbed to the great storm which raged on Lake Superior recently. Since that storm vessel masters have been exchanging opinions and all agree that if it had occurred a month later the vessels could have weathered it. Frankly, they did not expect a storm so early in September and were not in shape to meet it. Hatch covers had not been fastened down and probably one or two of the vessels were loaded beyond a safe draught for heavy weather. Moreover, some of the modern steamers had an unpleasant experience with the patent hatch covers. Water was admitted to the hold by the springing of these covers. Quite a number of the modern boats were badly pounded and in some instances, notably the Douglass Houghton and the Colonel, the forecastle deck sagged two or three inches.

Firm in the belief that his boat The Dixie is the fastest in the country and has an excellent chance to win the international trophy, E. R. Thomas has entered her in the motor boat carnival to be held on the Hudson river beginning next Thursday. The millionaire horse owner and automobilist will pilot the speedy craft himself in all the races, including the long distance contest to Poughkeepsie and return. The boat has an eight-cylinder engine which supplies 150 H. P. The start of the boat races will be at a point opposite West Ninety-seventh street, and more than thirty power driven boats will participate. There will be racing on Thursday, Friday and Saturday.

The survey of the harbor at Eureka, Humboldt county, California, ordered by Col. Heuer, engineer of the United States government, has been completed. It is hoped that a congressional appropriation will be secured for the bar and the harbor.

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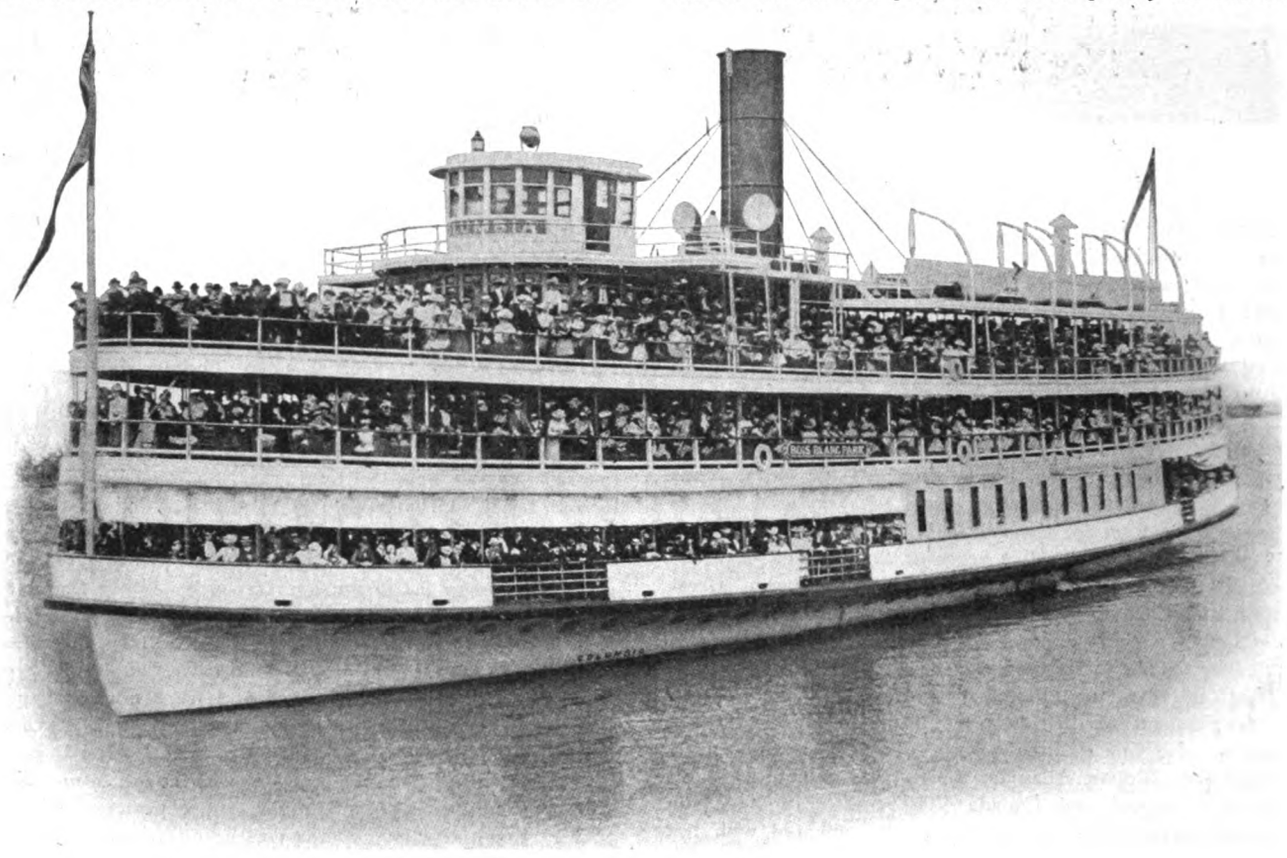
PASSENGER STEAMER COLUMBIA

The big passenger steamer Columbia, of the Detroit, Belle Isle & Windsor Ferry Co.'s fleet, Walter E. Campbell, president, which has been operating on the Bois Blanc Park service of this company on the Detroit river, closed her regular excursion season last week and is now engaged in giving a series of excursions from Lake Erie ports. She gave an excursion from Cleveland on Wednesday of this week and will give another one on Tuesday next. The Columbia is an ideal pleasure craft, having a licensed carrying capacity of 3,566 passengers with a dancing floor capable of accommodating 1,000 persons at one time. Her deck spaces are entirely open, having no stateroom accommodation whatever, and she has proved immensely popular in the 18-mile run down the Detroit river from Detroit to Bois Blanc. The accompanying photograph taken on the Detroit river will show in what manner this magnificent excursion steamer is patronized by the people of Detroit. Should this series of Lake Erie excursions prove to be popular, they will be repeated next year.

The Columbia was built by the Detroit Ship Building Co. in 1902, and is 216 ft. long, 45 ft. beam and 12 ft. 6 in. deep. Her engines are triple expansion with cylinders 21½, 34 and 54 in. diameter by 36 in. stroke, supplied with steam from two Scotch boilers, 12 ft. diameter and 13 ft. 2 in. long.



PASSENGER STEAMER COLUMBIA NOW MAKING A LAKE ERIE EXCURSION TOUR.
Photo taken on Detroit river.

At McKee's Ship Yard, East Boston, Mass., the keel has just been laid for a new ferry boat for the Boston, Revere Beach & Lynn railroad, to be a duplicate of the Ashburnham.

The Eastern Steamship Co.'s new steamer now building at a cost of $450,000 will be named Governor Cobb, in honor of the governor of Maine.

CANADIAN GRAIN RATES

Fort William, Ont., Sept. 11.—The Dominion Maritime Association has made the following minimum rates for the shipment of grain from Port Arthur and Fort William, for the fall season of 1903. The association is stated to include "all Canadian grain carriers."

	Sept. 15 to Oct 15.	Oct. 15 to Nov. 15.
To all Lake Huron and Georgian Bay ports.	2 c	2½c
To all Lake Erie ports, including Detroit...	2¼c	2¾c
To Kingston and Prescott.....	4⅝c	5⅛c
To Montreal	6¼c	6¾c

After Nov. 15 special arrangements for individual cases.

Of course this is an absurd regulation and cannot be maintained. In the first place there is no penalty for non-compliance, and in the second by Oct. 15 it is practically certain that the Canadian shippers will be forced to move much of their grain to Buffalo on American vessels, and these are not included in the arrangement. So soon as the great mass of American tonnage is invited to assist in the movement of this Northwest Canada wheat, rates will be a matter of negotiation from day to day. The amount of Canadian grain tonnage, though it has grown enormously in the past few years, is not commensurate with the task before it, and the Canadian roads from the lakes to tidewater will be swamped with offerings of tonnage. Then, too, a lot of Canadian tonnage is now tied up for the season with ore charters from American ports at the head of the lakes.

New grain has not yet begun to arrive here, but the roads have both overhauled their equipment and terminals, including elevators, and are ready for it. That there is to be a larger movement than in any past year everybody admits, and the feeling now is that it will be even larger than the conservative element was willing to admit a few weeks ago.

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LAKE CARGO RECORDS

With the frequent announcement of broken records in the lake carrying trade, the true inwardness of results accomplished could not be impressed upon the unaware with the scant announcement from time to time that this boat or that boat has broken a record either in size of cargo carried or length of time taken to load or unload the same. The two steamers, Elbert H. Gary and George W. Perkins, owned and controlled by the Pittsburg Steamship Co., now hold all ore carrying records on the lakes. The largest cargo of the Gary through St. Mary's canal was over 11,093 tons. As a matter of comparison it may be interesting to know that in 1901 the barge Manila held the record with 7,398 gross tons; in 1902 the barge Smeaton held the record with 7,576 gross tons; in 1903 the steamer Edenborn carried 7,799 gross tons through the canal, and in 1904 the steamer Augustus B. Wolvin captured the record with 10,245 gross tons.

The steamer Elbert H. Gary, which went into commission May 29 of this year, has to date carried ten cargoes as follows: Ashland to South Chicago, 10,597; Ashland to South Chicago, 10,728; Ashland to South Chicago, 10,877; Ashland to South Chicago, 10,757; Ashland to South Chicago, 10,828; Escanaba to South Chicago, 12,338; Ashland to South Chicago, 11,093; Ashland to South Chicago, 11,034; Ashland to South Chicago, 11,043; Ashland to South Chicago, 10,870. The steamer George W. Perkins which went into commission July 11 has delivered seven cargoes, five of which are as follows: Duluth to Conneaut, 10,514; Two Harbors to Conneaut, 10,519; Two Harbors to Conneaut, 10,714; Two Harbors to Conneaut, 10,654; Two Harbors to Conneaut, 10,514; Two Harbors to Conneaut, 10,760; Two Harbors to Conneaut, 10,244.

The draught of these big carriers is an essential item, but aside from one instance, the one in which the Gary carried 11,034 tons from Ashland to South Chicago when she drew 19 ft. 9 in. forward and 20 ft. 1 in. aft, are not available. The Gary in her record cargo of 12,328 gross tons from Escanaba to South Chicago had a draught of over 22 ft., but the water between these two points is exceptional and cannot be taken as criterion in the general ore carrying trade.

SHIP BUILDING AT SUPERIOR

Superior, Wis., Sept. 11.—The yard of the Superior Ship Building Co. will be very active this winter and is now more lively than it has been since the launch of the Perkins last spring. Five ships have been in the yard the past few days, the North Wind, Miller, Roebling, Stephenson and Case, all to have new plates put in and old ones straightened. Most of these were out in the recent severe storm on Lake Superior. Two 545 ft. ships will be built at this yard this winter, one for Hawgood and the other for H. H. Oakes. One of the slips is to be lengthened 40 ft. and the gantry crane is to have one of its arms lengthened some 20 ft. This work has commenced. Material for the ships cannot begin to arrive for some time, but the vessels will be pushed as soon as it comes. It is expected that about 750 men will be employed in the local yards during the winter.

A very pleasant dinner was given to Capt. Gillies, of the steamer Superior, at the Hotel Superior a few days ago. There were present the officers of the ship and the agent of the line and most of those who attended the launch of the ship, as well as some additional Superior people.

The grain inspection struggle is still on, but there does not seem to be any very effective opening for the Superior crowd, though it is hoped that by the aid of Eastern millers and buyers a sort of boycott will be placed on Duluth inspection, and the country will be forced to ship here in order to sell its product. The elevators here all seem to be closed to grain inspected under Wisconsin rules, however, and this part of the proposition is rather serious. The actual grain men here have all moved to Duluth and given up the fight.

GRAIN SITUATION AT DULUTH

Duluth, Minn., Sept. 11.—The Capitol Elevator Co. has spent a large amount of money in refitting and adding new machinery to the old Imperial mill shipping and storage elevators on the Rice's point front. These houses are now said to be better equipped with cleaning and other machinery than any shipping houses. The storage capacity of the two is 1,600,000 bu. and the shipping house has a capacity for loading 400,000 bu. per ten hours into ships.

Receipts of wheat are growing larger, there were 600 cars on Tuesday morning this week. The movement of 750,000 bu. of old wheat eastward via Duluth from Minneapolis is over. No flax is coming to elevators yet, but there is much oats and barley. Country elevators report that the business is already reaching large proportions and will soon far exceed that of a year ago. Vessel rates to Buffalo are now as follows: Wheat, flax and rye 2 cents; oats, 1⅝; barley, 1¾. Four cargoes to Montreal were taken this week, three on ships of the Great Lakes & St. Lawrence Co. and one on a small tramp, the Wahcondah. This business is sure to pick up materially this fall.

RIVER NEWS

James Rees & Sons now have a contract for the construction of a stern wheel steamer to be named Samuel S. Brown, for the Memphis & Kansas River Packet Co., and ready to go into commission next year. The boat, the hull for which will be constructed at the Ambridge plant of the American Bridge Co., will be 230 ft. long, 44 ft. beam and 6 ft. 6 in. depth of hold. She will have compound condensing engines with cylinders 15.5 in. and 32 in. by 8 ft. stroke, and will be equipped with four boilers each 44 in. in diameter and 24 ft. long with six flues to each boiler.

Since Jan. 1 the United States civil service commission has offered the position of local and assistant inspector of hulls four different times, but no Pittsburg men have made an effort to get the berth which pays salaries ranging from $1,800 to $2,500 per year.

The steamer Bessie Smith struck the sill at No. 2 lock, which is known as Merriam dam, in the Ohio river above Sewickley, last Thursday, and punched a hole 3 ft. square in the bottom. Other steamers went to the rescue and with pumps prevented her from sinking.

PERSONAL

The Lackawanna line, with headquarters at 253 La Salle street, Chicago, announces the following appointments: Frank J. Martin, east bound agent; A. C. Batelle, west bound agent; E. J. Morengo, contracting agent; Burt Pedersen, contract agent. W. H. Wallace has been appointed southern freight agent with offices at Cincinnati; Mr. W. C. Richter has been appointed traveling freight agent at Fort Wayne, Ind., vice Mr. F. J. Martin, promoted.

A boom of piles from one of the big log rafts towed recently from the Columbia River to San Francisco broke loose. The ebb tide carried the logs out to sea, where they form a great menace to the safety of vessels. The logs belonged to the Hammond Lumber Co., which employed a tugboat and two launches to gather as many of them as possible. The steamer J. S. Higgins, from Fort Bragg, on entering San Francisco harbor, had to thread her way through a mass of floating piles. For some time to come vessels on the Californian coast will be in considerable danger from these floating logs.

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HANDSOME GIFT TO THE CRUISER CALIFORNIA

The cruiser California, launched nearly two years ago, is still lying at the Union Iron Works' yards. Work is being pushed forward rapidly on the new war vessel, and during the early part of the coming year it is expected she will receive the finishing touches and go into active commission. In honor of the name, California, the new cruiser was launched and christened under the immediate auspices of the "Native Sons and Daughters of the Golden West," an organ-

GIFT TO THE CRUISER CALIFORNIA.

ization numbering many thousands in the state. Very recently the Native Daughters did a very handsome thing in behalf of the state of their birth. A large and handsome bronze relief was designed, cast, and presented to the new and formidable cruiser that in a few months will pass into active commission. This beautiful gift is four feet in diameter—being circular in form. The design was the work of Mr. Robert I. Aitkin, a well-known young modeler and sculptor of San Francisco.

It is a very appropriate gift—representative of the state. The design closely resembles the seal of California—having the mythological figure of a helmeted female in the center; the rising sun, the grizzly bear, vessel, miner, sheaves of grain and fruits, the state motto—Eureka, etc.

All around the outer borders are the California poppy in strong relief. On each side of the central figure are furled flags. Below, encircled in a wreath appears a star (the "Star of Empire") and the inscription, "U. S. Cruiser California, from the Native Daughters of the Golden West," etc. On the scroll below are the letters, "N. D. G. W."

The sum required to pay for this handsome gift was raised by popular subscription among the Native Daughters. It has been placed on the forward part of the cruiser in a very conspicuous position.

EFFICIENCY OF RUSSIAN AND JAPANESE FORCES

Engineering of London has drawn some comparisons of the comparative efficiency of the Russian and Japanese forces from the relative losses. The deductions are based upon data furnished to the London *Times* by its Tokio correspondent. In the case of the land forces the calculation can only be very approximate. In round numbers the Japanese appear to have lost up to June of this year 166,000 in killed and wounded. The losses on the Russian side are not so easily got at; but the Russian admissions, which are not likely to err by excess, put them at 320,000—that is, double those of the Japanese. But these latter figures are likely to be greatly exceeded when the wastage by disease is taken into account, for there can be no doubt that the Russians have suffered far more in this respect than the Japanese. The sanitary arrangements for the Mikado's army are much more complete and efficient than those for the Czar's troops, and their food and methods of living are more conducive to health.

According to the figures given by the *Times* correspondent up to the date he states, Russia has lost 346,588 tons of fighting ships, not including minor craft; while the Japanese navy will emerge from the fight with a displacement 25,435 tons greater than when the war began. This latter figure, however, must be largely increased, as the latest information from Japan shows that a number of the large Russian vessels which were sunk have been raised, and they will be added to the Japanese navy. The story of the Russian naval squadrons in Far Eastern seas since the war commenced is shown in the following table:

RUSSIAN NAVY.

Nature of Vessels.	Engaged in the War.		Sunk.		Captured.		Interned		Remaining.	
	No.	Displacement.	No.	Displacement.	No.	Displacement.	No.	Displacement.	No.	Displacement.
		tons		tons		tons		tons		tons
Battleships ..	15	180,980	12	144,958	2	23,110	1	12,912	..	..
Armored cruisers	7	63,533	5	38,979	..	..	..	..	2	24,554
Seagoing coast defence Ironclads ..	3	13 212	1	4,126	2	9,086	..	..	..	..
Cruisers ..	13	65,416	6	26,341	..	..	5	29,115	2	9,960
Other kinds, excluding converted cruisers	21	76,793	14	25,222	1	11,700	2	11,449	4	28,422
Destroyers ..	24	10,290	19	5,666	2	590	11	3,334	2	700
Totals ..	83	410,224	57	245,292	7	44,486	19	56,810	10	63,636

This table is not quite complete, as it does not include torpedo boats, special service steamers, as well as converted cruisers and a number of vessels whose fate is uncertain. The broad result is very striking: out of a total of eighty-three ships, with a displacement of 410,224 tons, sent by Russia into the belligerent arena, only ten, with a displacement of 63,636 tons, remain in her fighting line.

The corresponding table for the Japanese navy is as follows:

JAPANESE NAVY.

Nature of Vessels	Engaged in the war.		Sunk.		Captured.		Interned.		Remaining.	
	No.	Displacement.	No.	Displacement.	No.	Displacement	No.	Displacement.	No.	Displacement.
Battleships ..	6	86 299	2	27,757	..	..	..	..	4	58,542
Armored cruisers	8	74 178	..	..	..	..	..	..	8	74,178
Seagoing coast-defence cruisers	2	11.112	..	..	..	..	..	..	2	11,112
Cruisers	20	68,481	4	12,733	..	..	..	..	16	55,748
Other kinds ..	18	26,689	4	4,797	..	..	..	..	14	21 892
Destroyers ..	22	7.425	2	738	..	..	..	..	20	6,687
Totals ..	76	274,184	12	46,025	..	..	..	..	64	228,159

This table also does not include torpedo boats, special service steamers, and converted cruisers. A comparison of the two tables brings out the fact that the Japanese force of seventy-six vessels, with a displacement of 274,184 tons, has sunk or captured sixty-four ships, with a displacement of 289,778 tons. On the other hand, while the Japanese have lost twelve ships, with a total displacement of 46,025 tons,

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they have captured or raised more than double this amount of tonnage. From the newspapers received from Japan by last mail we see that the Japanese naval authorities call attention to the fact that the Peresviet, which has just been raised at Port Arthur, was one of the strongest ships in Russia's Pacific squadron. She left Kronstadt in 1901.

The Peresviet and the Ossliabya were laid down in 1898, under Russia's new program of naval expansion, and were supposed to embody the best results of modern naval progress. The approval that was accorded to them by expert opinion, led to the laying down of the Pobieda, a sister ship, in 189. These vessels did not carry a very heavy armanent—four 10-in. and eleven 6-in. guns. The *Hochi Shimbun* says that the Poltava will be the next vessel to be floated, and that she will be followed by the Pobieda. The Poltava is a smaller type of vessel, and somewhat older. Her displacement is 10,960 tons, and her speed only 16 knots. She is lying on an even keel. The Pobieda has a slight list, but it is not expected that any serious difficulty will attend her raising. The Retvisan (battleship, 12,700 tons, completed in 1900) and the Pallada (protected cruiser, 6,630 tons) are said to be the most injured, but the expectation is that they too will be saved, and in that event the Sevastopol alone would remain at the bottom. This forecast, if trustworthy, means that there will be added to the Japanese navy three first-class and one second-class battleships, one first-class armored cruiser, and one protected cruiser. Adding the results of the battle in the Sea of Japan, and the salvage operations at Chemulpo, we get this table:

SHIPS TO BE ADDED TO JAPANESE NAVY.

	Tons.
Orel, battleship, 1902	13,516
Retvisan, battleship, 1900	12,700
Peresviet, battleship, 1898	12,674
Pobieda, battleship, 1900	12,674
Poltava, battleship, 1894	10,950
Nicholai I., battleship, 1889	9,700
Bayan, armored cruiser, 1900	7,800
Varyag, protected cruiser, 1899	6,500
Pallada, protected cruiser, 1899	6,630
Seniavine, coast defense ironclad, 1894	4,126
Apraxin, coast defense ironclad, 1896	4,126

It is stated that much of the success achieved in raising these ships is due to a new pumping machine recently imported. Two of these are at work. Each pumps 4,000 tons per hour. The name of Capt. Sakamoto is specially mentioned in connection with the work. He commanded the unfortunate Yashima, and his exceptional skill in salvage operations has been conspicuous in the raising of the Bayan. These facts and figures speak volumes for the efficiency of the Japanese navy, while the report of the Russian admiral reveals a state of affairs, both as regards men and material, which go a long way towards explaining the complete defeat of the Russian squadrons. The *Kokumiu Shimbun* remarks truly: "Never was a navy burdened with a heavier and more onerous responsibility than the Imperial Japanese navy at the beginning of the war. The enemy's Vladivostock and Port Arthur squadrons combined were in themselves a fair match for all the naval strength we could place under Admiral Togo's command; but, in addition, the enemy had the Baltic fleet to draw upon, while we had nothing more to fall back upon; so that Admiral Togo's work was not only to demolish a strong foe present—a task hazardous enough in itself—but to exterminate his reinforcements to come. How well Admiral Togo executed his part the results very clearly show."

The war has also been the means of adding considerably to the Japanese mercantile marine. The appended list gives the merchant ships captured by the Japanese navy, and no doubt it will interest many of our readers: when not described as a sailing ship, steamer is to be understood. It is to be noted that in no case was a non-combatant vessel sunk by the Japanese navy.

The Russian record of vessels captured is very different from that of the Japanese. It is not necessary to reproduce it, as it only contains the names of fifteen ships, which have an average tonnage of 234 tons, only one being over 1,000 tons. In addition, the Russian cruisers destroyed a considerable number of fishing boats and small craft, which could offer no effective resistance. Such action might have been justified from a merely legal point of view, but very few naval powers would care to take advantage of such a provision, as the whole tendency of modern civilization is to recognize the principle of the immunity of private property.

Ship's Name.	Nationality.	Tonnage.
1. Ekaterinoslav,	Russia	5,627
2. Mukden,	Russia	1,567
3. Russia,	Russia	2,312
4. Argun,	Russia	2,458
5. Manjuria,	Russia	6,193
6. Alexander,	Russia	261
7. Resnick, sailing ship,	Russia	87
8. Nicolai,	Russia	123
9. Mikhael,	Russia	3,461
10. Kotic,	Russia	400
11. Juliade,	Russia	?
12. Manchuria,	Russia	2,937
13. Bobrick, sailing ship,	Russia	125
14. Nadejuta,	Russia	68
15. Thalia,	Russia	?
16. George,	France	179
17. Fuhping,	Germany	1,393
18. Veteran,	Germany	1,199
19. Nigretia,	England	2,368
20. King Arthur,	England	1,416
21. Rosalie,	England	4,370
22. Redington,	England	4,421
23. Wilhelmina,	Holland	4,295
24. Bawtry,	England	2,407
25. Oakley,	England	3,798
26. Burmah,	Austria	3,071
27. M. S. Dollar,	America	4,216
28. Wyefield,	England	3,235
29. Siam,	Austria	3,160
30. Palos,	Germany	2,398
31. Apollo,	England	3,829
32. Scotsman,	England	1,677
33. Silvania,	England	4,187
34. Powderham,	England	3,019
35. Severus,	Germany	3,307
36. Romulus,	Germany	2,630
37. Easby Abbey,	England	2,963
38. Vegga,	Sweden	2,562
39. Venus,	England	3,558
40. Aphrodite,	England	3,949
41. Tacoma,	American	2,812
42. Harbarton,	England	3,256
43. Industrie,	Germany	198
44. Henry Bolckow,	Norway	1,006
45. Quang Nam,	France	1,431
Total, over		108,000

Thus the Japanese show to the advantage of the Russians, not only by their superior efficiency in every respect, but also by their greater regard to the dictates of humanity.

A great deal of work is going on at the Risdon Iron Works, San Francisco. The U. S. Army Transport is being repaired and having a new deck fitted. The boilers of the U. S. A. T. Thomas are being renewed and other work done on her. A new rudder will be put into the steamer Asuncion and the North American Trading Co.'s sea-going dredger Pacific is receiving a thorough overhauling. The revenue cutter Thetis is getting a new boiler, new planking, some new frames and general repairs to her engines. A new plate is being put into the liner Australia, in place of one which was crushed by an iceberg.

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SUMMARY OF NAVAL CONSTRUCTION

The summary of construction prepared by the bureau of construction and repair of the navy department shows that the battleship Louisiana is now a trifle ahead of the sistership Connecticut building at the New York navy yard. Following is the summary:

Name of Vessel.	Building at	Percent of Completion, Aug. 1.	Sept. 1, 1905.
	BATTLESHIPS.		
Virginia	Newport News S. B. & D. D. Co.	91.37	92.89
Nebraska	Moran Bros. Co.	77.00	79.58
Georgia	Bath Iron Works	85.00	86.44
New Jersey	Fore River Shipbuilding Co.	87.7	89.3
Rhode Island	Fore River Shipbuilding Co.	92.1	93.00
Connecticut	Navy Yard, New York	83.67	86.15
Louisiana	Newport News S. B. & D. D. Co.	82.81	86.40
Vermont	Fore River Shipbuilding Co.	57.1	61.4
Kansas	New York Shipbuilding Co.	57.8	60.1
Minnesota	Newport News S. B. & D. D. Co.	69.9	71.16
Mississippi	Wm. Cramp & Sons	34.48	38.71
Idaho	Wm. Cramp & Sons	*31.22	33.66
New Hampshire	New York Shipbuilding Co.	15.2	18.2
	ARMORED CRUISERS.		
California	Union Iron Works	80.4	81.8
South Dakota	Union Iron Works	78.9	80.6
Tennessee	Wm. Cramp & Sons	82.02	84.32
Washington	New York Shipbuilding Co.	82.03	83.9
North Carolina	Newport News S. B. & D. D. Co.	1.22	14.96
Montana	Newport News S. B. & D. D. Co.	10.81	13.04
	PROTECTED CRUISERS.		
St. Louis	Neafie & Levy S. & E. B. Co.	71.4	75.7
Milwaukee	Union Iron Works	79.00	80.6
Charleston	Newport News S. B. & D. D. Co.	99.00	99.7
	GUNBOATS.		
Paducah	Gas Engine & Power Co.	92.4	100.00
	TRAINING SHIPS.		
Cumberland	Navy Yard, Boston	95.00	95.00
Intrepid	Navy Yard, Mare Island	97.5	97.5
	SCOUT CRUISERS.		
Chester	Bath Iron Works	0.00	0.00
Birmingham	Fore River Shipbuilding Co.	0.00	4.7
Salem	Fore River Shipbuilding Co.	0.00	4.3
	TORPEDO BOATS.		
Goldsborough	Wolff & Zwicker	99.00	99.00
O'Brien	Lewis Nixon	99.00	99.00
	SUBMARINE TORPEDO BOATS.		
Submarine T. B. No. 9,	Fore River Shipb'ing Co.	12.6	17.6
Submarine T. B. No. 10,	Fore River Shipb'ing Co.	11.5	16.5
Submarine T. B. No. 11,	Fore River Shipb'ing Co.	11.5	16.5
Submarine T. B. No. 12,	Fore River Shipb'ing Co.	11.5	16.5

*Note—Percent of completion of Idaho should have been 31.22 instead of 33.22 as printed in statement of Aug. 10, 1905.

CHICAGO GRAIN REPORT

Chicago, Sept. 12.—The immediate situation is practically unchanged from last weekly report. While a fairly extensive movement prevailed, vessel supply was sufficient to meet the going requirement and rates were held at basis 1⅛ cent, Buffalo and Bay corn. The tone appears to be working more strongly and at the outset of present week there is good indication of establishing Buffalo market of 1¼ cent per bushel. Line steamers are about fully occupied in package freight handling, which bids well for their active engagement during balance of season. With normal trade development, judging from all eastern and export indications, this quarter is promising of a decidedly substantial support to the generally anticipated good call for carriers throughout balance of season.

Shipments of the past week as noted were distributed as follows: Via all rail lines of flour, 72,124 bbls.; wheat, 71,366 bu.; corn, 198,095 bu., and oats, 748,900 bu. Via lake to Buffalo and other American points, of flour, 91,578 bbls.; wheat, 126,750 bu., and corn, 1,803,790 bu. And via lake to Canada points, of corn, 484,500 bu. and oats, 197,000 bu.

Lake and Rail Shipments:

	This week.	Last week.	Same week last year.
Wheat	201,116	291,156	309,165
Corn	2,496,385	2,776,515	3,388,012
Oats	946,825	1,180,390	620,654
Rye	38,712	66,937	20,193
Barley	73,919	34,291	36,878
	3,756,957	4,349,289	4,374,902
Flour	164,997 (bbls.)	166,177	80,730
		Since Jan. 1, 1905.	Same time last year.
Wheat		9,466,976	10,029,275
Corn		67,513,541	49,587,452
Oats		37,412,535	32,371,614
Rye		736,605	878,661
Barley		2,726,646	2,901,114
		117,856,303	95,768,116
Flour		4,197,870 (bbls.)	5,245,404

Stocks in Public and Private Elevators:

	This week.	Last week.	Same week last year.
Wheat	5,267,000	5,493,000	4,081,000
Corn	3,512,000	3,444,000	4,293,000
Oats	8,679,000	8,095,000	9,129,000
Rye	147,000	142,000	675,000
Barley	83,714	53,714	94,000
	17,688,714	17,227,714	18,272,000

LAUNCH OF THE HENRY A. LAUGHLIN

MISS JOSEPHINE WILBERT.

The tow boat Henry A. Laughlin, built by the James Rees & Sons Co. for the Jones & Laughlin Steel Co., was launched from the Duquesne way wharf, Pittsburg, last Saturday morning. Miss Josephine Wilbert, daughter of Senator David A. Wilbert, christened the steamer. Miss Helen Scully and Miss Nora Hornberger were maids of honor. The steamer is 135 ft. long, 24 ft. beam and 4 ft. 6 in. deep. She will be equipped with compound tandem condensing engines with 12-in. high pressure and 24-in. low pressure cylinders and a 6-ft. stroke of piston, supplied with steam from three boilers 38-in. diameter and 28 ft. long. Capt. Warren L. Elsey, master of transportation of the Jones & Laughlin Co., superintended the building of the steamer; Thomas Dunbar had charge of the launching; Henry Raring superintended the hull construction; John Torrens the machinery, and J. R. Ingoldsby the cabin work.

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AROUND THE GREAT LAKES

The Great Lakes Towing Co. will operate two tugs at Huron the balance of the season.

The steamer Wyoming, package freighter, is at the yard of Abram Smith & Son, Algonac, Mich., for repairs.

The steamer Peter White, built at the Ecorse yard of the Great Lakes Engineering Works, went into commission this week.

The steamer Chauncey L. Hurlburt is being given a new wheel at the floating dock of the Great Lakes Engineering Works at Ecorse.

The steamer Wm. G. Mather, building at the Ecorse yard of the Great Lakes Engineering Works of Detroit, will be launched Sept. 23.

The annual meeting of the American Ship Building Co. will be held at the company's offices in New Jersey on Wednesday, Oct. 4.

The Reid Wrecking Co., Sarnia, has floated the wreck of the Gilchrist steamer Yakima, which stranded and burned near Stag Island last June.

Col. N. B. Adams has advertised for bids on the construction of Holland Harbor. The north pier will be extended 750 ft. and the south pier 800 ft.

The steamer Erin which has been at the yard of the Great Lakes Engineering Works for repairs necessitated by the break in her cylinder, is again in commission.

Joseph Wm. Nejman, born at Seddoby, Sweden, but now at Ely, Minn., wishes to find his two sons, Joseph Wm. and Axel August Nejman, who are sailors on the great lakes.

Three men were drowned in St. Mary's River when the little Canadian fishing tug Shamrock collided with the steel steamer W. C. Richardson off Point aux Pines last week.

A new chart in colors of Lake Huron, showing the northeast coast of Green bay, has just been issued by the United States Lake Survey Office, and is for sale by the *Marine Review*.

The steamer Henry R. James, burned last week at Ogdensburg, will be taken to Buffalo this week to complete repairs. She will be placed in the Rutland line service between Chicago and Ogdensburg.

The National Steamship Co. with a capital stock of $150,000, has filed articles of incorporation in Indiana. The company will operate a line of steamers running from Michigan City to Michigan points. Michigan capital is interested in the new company.

The steamer City of Rome, of the Gilchrist fleet, which was in collision with the Linden, is undergoing extensive repairs at Cleveland. She will receive a new stem, new planking forward, new frames and top timbers, the deck forward and focuses renewed.

Capt. Frank Meno, of St. Clair, formerly mate of the steamer George Peavey, became master of the steamer John Sharpless of the Montreal line, succeeding Capt. John J. Johns. Capt. Meno is 28 years old and is probably the youngest master on the lakes.

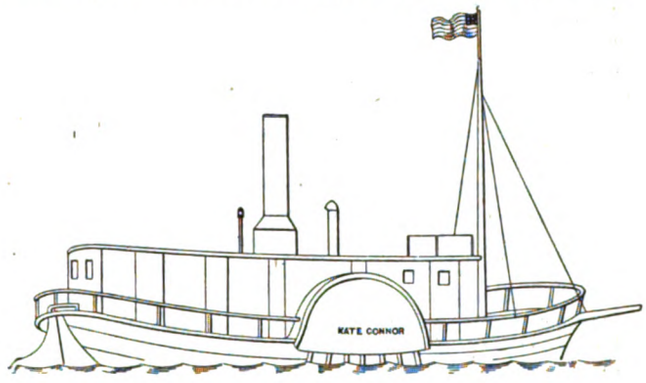
The damage to the cargo of the steamer North Wind which sunk just outside of the harbor of Duluth during a gale recently, has been placed at $50,000. The steamer will be out of drydock within a few days. It was found that she has not been seriously damaged beyond the hole in her side.

Lieut. Col. Gourdeau, deputy minister of marine, and Mr. B. H. Fraser, chief engineer of the department of marine and fisheries, will under the direction of Raymond Prefontaine, minister of marine, make a thorough examination of the sinking of the government steamer Hosanna by the Empire.

The Duluth, South Shore & Atlantic railway will construct a new ore dock at Marquette. The new dock will be located on the site of the old No. 3 dock which was dismantled a few years ago. The height of the new dock will be so great that it will be necessary to cross Front street with the railroad tracks on an overhead bridge. The railway company has therefore asked permission of the city of Marquette to erect and maintain a girder bridge across the street. The new dock will be somewhat over 70 ft. in height and will be designed to load the modern carrier expeditiously. It is understood to be the intention of the company to have the structure completed by the opening of navigation next year.

FIRST STEAMBOAT ON SALT LAKE

The American Machinist published a sketch of the first steamboat on Salt Lake in its issue of Sept. 7. It was built by Gen. Connor and was a flat-bottomed scow with pointed ends, the length being 90 ft. and the width 30 ft. The machinery for this boat was supplied by Mr. Wm. J. Silver,



FIRST STEAMBOAT ON SALT LAKE.

now the Silver Bros. Iron Works Co. Mr. Silver, however, did not build the engine; for this purpose a crank and flywheel steam-pump was to be had and by disconnecting the water end and gearing the pump to the paddle-wheel shaft, it was made to drive the boat. As an illustration of the paucity of resources, the pump had no globe valve and such a thing could not be obtained in the western territory. Eventually a 2-in. plug cock was found and this was made to serve the purpose of a throttle. The boat ran on the lake for several years and gave excellent service.

George J. Gillig of Red Bank, who bought the fast motor boat, the X. P. D. N. C., from the estate of the late Frank Croker, has entered the speed craft for the motor boat carnival to be held on the Hudson river on Sept. 14, 15 and 16. It is now in use on the Shrewsbury river. Judging from the entries already received, a record list is assured. The entries will close Monday, September 4, with Hugh S. Gambel, secretary, 314 Madison ave., New York. Three revenue cutters have been offered by the department of commerce and labor to patrol the course and the iron steamboat Sirus has been chartered for the officials and for those holding tickets. The races will start at a point opposite Ninety-seventh street.

F. W. Ofeldt & Sons, formerly located at the foot of Twenty-fifth street, Brooklyn, N. Y., well known in marine circles as yacht and launch builders and in the automobile trade as manufacturers of steam automobile specialties, have purchased the Charles L. Seabury property at Nyack-on-the-Hudson, New York. They intend to rebuild the ways used by Mr. Seabury and will haul, store and repair yachts and launches of all sizes. The firm also intends to build a large basin for the laying up of yachts. This firm is the oldest in the motor boat business, as the late F. W. Ofeldt was the inventor of the naphtha and alco-vapor launches.

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GREAT DANGER FROM LOG RAFTS

Despite the continued protest of ship owners, shippers, and all interested in marine matters generally, the towing of colossal log and timber rafts still continues down the Pacific coast. Some of these enormous ocean rafts come from along Puget Sound, but the most of them are brought from the Columbia river, being constructed at a point called Stella, about twenty miles above the mouth.

Thus far this season several gigantic rafts have been towed from the latter place. Fortunately, no serious accident has occurred to these structures, due to the fact that they are lashed together by huge chain cables, and that none of them have encountered storms or heavy seas. Of course, the time chosen for bringing these rafts down is during midsummer, when both winds and waves are on their best behavior. No raft, however powerfully constructed, could hold together in a heavy sea. So, at best, they are regarded as a constant menace by all who are interested in navigation—and for a very good reason.

Very recently, one of these pile rafts went to pieces after it had safely reached San Francisco Bay. A strong ebbing tide scattered them for miles, hundreds of piles drifting down almost to the Golden Gate. However, none it is believed made an escape out into the open sea. For many hours thousands of these huge piles were tossed about the great expanse of waters to the very imminent peril of all kinds of vessels, the floating drydocks, and the wharves. A number of vessels had very narrow escapes from destruction and damage.

Many tugs and small steamers were employed to gather up and "herd" these dangerous pieces of timber; and after long and hazardous labor vast numbers of these piles were collected and secured; but a great number were either left at large, or cast up high and dry on the great winding shore line of the bay. Very fortunately no disastrous accident occurred to any of the hundreds of vessels in the harbor.

It is asserted by those protesting that these immense rafts can enter the bay safely only when the weather is amiable, and the sea smooth. They predict that some day, given a high wind and angry waters, some such a collection of unwieldy timbers will go to pieces and fall foul of a liner in the darkness, with a most terrible and disastrous sequel.

Any one of these two-ton trunks of trees is a dangerous menace, and they lie low in the water just like an enemy awaiting a foe. A searchlight does not always find them, but they are there on the surface, and their lumbering bulk will be felt by anything that strikes them—whether it be a battleship or a Whitehall boat.

All shipowners are firmly united in protesting vigorously against what they claim is a very grave menace to navigation, especially to coastwise traffic. A strong effort is being made to have this danger abolished.

JAPANESE NAVIGATION TO INCREASE

Considerable activity among the Japanese Trans-Pacific steamship lines, formerly doing business, is now manifesting itself since peace has been decided upon between Russia and the Empire of the Mikado.

As before announced, the Toyo Kisen Kaisha is to dispatch its first liner—the America Maru, from Yokohama for San Francisco about Sept. 28, resuming service between the Orient and the latter port. The statement is made on good authority that the company's big modern liner now being built at Nagasaki, and to be of 13,000 tons register, will be one of the best equipped steamships in the Pacific—with Marconi wireless appliances aboard, as well as a daily newspaper published on board that will record all the incidents of the passage calculated to prove attractive to the passengers on the steamship.

In the meantime, the former liners of the Toyo Kisen Kaisha are to resume service. They gave the best there that was to be had and the same old service will be as good as anything now obtainable on any of the passenger liners crossing the Pacific.

It is also announced in connection with the peace negotiations that the Mitsui company, a well known Japanese firm, will establish a freight line between Yokohama and the Puget Sound, in opposition to the Nippon Yusen Kashai. It is generally believed that the return of peace will witness a great increase in business between the Pacific coast and Japan.

The well known bark Alden Besse, for years engaged in the sugar trade between San Francisco and the Hawaiian Islands, has been sold to a Japanese firm for the sum of about $5,000. The vessel will sail soon to Puget Sound to take on a cargo of fish, and it is likely that she will never be seen again in the port of San Francisco. Time was when a vessel as well found as the Alden Besse would have brought $20,000 or $30,000, but vessels are cheap now. She went to Japan for about $4,000.

A LITTLE WATER GREYHOUND

With the exception of the torpedo boats built on the Pacific coast, the fastest craft ever built west of the Rocky Mountains has just been completed, and made her trial trips around the Bay of San Francisco.

This little vessel is only 40 ft. long over all, and about 5 ft. beam and 4½ ft. hold. She was built by the Union Gas Co., of San Francisco, and designed as an exhibit at the Lewis and Clark Exposition at Portland, Ore. The craft has been christened Union. Her engines are of 55 I. H. P. and the propeller is three-bladed, 3½ ft. diameter. The engines are capable of making 150 revolutions per minute.

The Union was thoroughly tested before being taken up to Portland over the government's course in San Francisco Bay. Under rather unfavorable conditions she made speed at the rate of 18.8 knots per hour. The wind was high, and the waters rough and choppy. It is claimed by the builders that the boat can make 20 knots per hour under favorable conditions without difficulty.

This little water greyhound cost a goodly sum of money—well up into the thousands. She is very sharp with symmetrical lines—a very handsome model, and is finished inside with the most elaborate mahogany woodwork, covered with a light turtle-back deck. The Union will not return to San Francisco, as two wealthy Portland men have purchased her and will take possession of the nautical beauty after the close of the exposition.

HOW PALTRY IT LOOKS

Editor *Marine Review:* Our 873,000 tons of American shipping engaged in foreign trade looks very paltry beside that of Great Britain, 10,209,000; Germany, 2,203,000; France, 1,218,000 and Japan, 944,000, in view of the fact that our exports and imports last fiscal year reached $2,636,000,000. Our exports were $1,518,000,000, or $58,000,000 more than those of Great Britain, while her ocean merchant marine tonnage is 11¼ times as much as ours. We lead Germany in total foreign commerce by about $300,000,000, but Germany leads us in foreign trade tonnage by 1,330,000 tons. France also leads us by 345,000 tons on $968,000,000 less foreign commerce. Even Japan had (in 1902) 71,000 more tonnage, while her foreign commerce in 1904 was less than one-fourth of ours. Between 1886 and 1902, Great Britain increased her foreign trade tonnage by 2,708,000 tons; Germany by 920,000 tons; France by 226,000 tons, and Japan by 825,000 tons.

Question: How much did ours increase (or decrease)?

WALTER J. BALLARD.

Schenectady, N. Y.

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PRESENT SYSTEM OF TUG MANAGEMENT

Buffalo, Sept. 12.—There used to be any amount of unpleasant things said of the present system of tug management on the lakes. I wonder if there is now. No doubt there is, for there used to be under the old system that was misnamed individual, but was combined just as far as individuals could come to an understanding in the business. It is no doubt much easier to find reasons for sharp remarks about the present combine than to recall those great days when Capt. Ryan or a tug from Oswego or Tonawanda was trying to buck against the combine at Buffalo, but always came out beaten and things went on as before. We are always much given to looking back to the days that are gone and forgetting much that was bad in them and piling as much of the imagined evil as we can on the doings of today, thus doing what we can to make it even.

It will have to be confessed, no matter what there is wrong in a single system, that something needed to be done with the old system of towing to make it sufficiently powerful to handle the 500-ft. steamers, not only afloat, but especially when they get aground. Tugs used to be powerful as compared with the old fleet and they could pull a tow post out of not a few of the craft of that day and occasionally out of themselves, but that test would not answer for today. It would be interesting to know what an advocate of the single-port system would propose to meet the needs of the new fleet. I have no reason for trying to make such an undertaking appear a hard job and would be willing to be set right if anyone sees why it would be better to divide things up again.

They say that when the days of stock companies first dawned on the business of the country and the world, there was much of the same sort of mistrust of such combines as there is now of the greater combines. It was proved in all sorts of ways that the element of independence and individualism in business and life of all sorts was forever driven out, so that there were a good many Daniel Boones diving into the wilds to find spots where the trail and the coil of the business corporation was not possible. It was all right, for the country fell into line all the faster on that account, though we may safely smile at such ideas now. And so again business found itself at the end of the short string that had been paid out ahead of it, and a few years ago the big combines began to lay, not merely a new, but a larger and longer string down to go by.

On the lakes the string paid out was a sort of tow line that had to be enlarged into a steel wire cable and attached to a boat that reached the whole length of our dock and most of the next one. The individual tug owners tried to cope with the situation by building more powerful towing machines every time, but the demand was for something more complete the lakes over than was possible if each port was to remain by itself. Let us not forget that this lake growth has been among the wonders of recent business expansion as shown the world over. Other interests have grown amazingly, but few have kept pace with the lake fleet.

I received the other day a government report of the ship building of the country, with the Atlantic coast, Pacific coast, great lakes and Mississippi river expansion each by itself as usual. We know in a general way, of course, what this showing would be, but it really takes such a list to bring it home to us, no matter how well we may be acquainted with it all from memory. The average size of lake craft going into business was in thousands of tons, where everywhere else it was in the hundreds only, even on the Atlantic coast, so it must be plain to anyone that some big advance must be made at once to meet the needs of such a fleet. This has been done, and it has been done better than one would expect, if the magnitude of the undertaking is reckoned along with the fact that it was so largely along new lines, with the fact that the tug business had for a long time been paying small profits or none at all where the individual interests were at war, as they were for instance in Chicago, so that the tugs had to go all the way to Milwaukee sometimes to make sure of a tow.

This system makes it possible for the management to set up and distribute nine wrecking outfits, so that when the steamer Miller gets ashore in the Straits region there is one not far away, and when it is found that more power is needed to release her there is another outfit within easy call. What would have been the state of things in the old individual days? It looks as if the new individuality, even if it has to be wrapped about with something decidedly large and general, was to be much more efficient on account of this rising up to meet the needs of the country. It is only where the combine is a mere artificial thing, got up mainly to put somebody out of business instead of to meet a distinct and crying want, that we should be afraid of it.

JOHN CHAMBERLIN.

The Erie railroad has arranged for the immediate expenditure of $225,000 for the installation of the most modern and efficient railway signal that has yet been put on the market. It is known as the Hall electric semaphore normal clear system and is operated by stationary storage batteries. The line between Bergen, N. J., and Middletown, a distance of 68 miles, is to be equipped at once. For the first 32 miles the signals will be put two-thirds of a mile apart; for the rest of the distance about one and one-third miles apart. It will require five power plants for charging the batteries, which will be located at Rutherford Junction, Ridgewood Junction, Suffern, Oxford and Middletown. The line to be protected has two and four tracks at different places, and is the most congested part of the Erie system. Hitherto a manual block, which is a tower with signals operated by a towerman, has been used as a block protection but it has been deemed best to install an automatic system for further protection and to accelerate the movement of trains. The new system will be extended over the entire line in the future.

Approximately $4,000,000 will be required to build the Genesee River railroad recently incorporated by officers of the Erie railroad. The new road is to be 34 miles long and will extend from Hunts, a small station near Portage, in Livingston county, on the Buffalo division to Cuba on the main line. Between Hornellsville and Cuba there are two very heavy grades, each reaching about 50 ft. to the mile which must be surmounted. The construction of this short line will give a grade of two-tenths percent,—practically a water-level route, as the grade on the Buffalo division from Hornellsville to Hunts exceeds that but little. The line is intended to be used chiefly for freight traffic and will add much to economy of operation by permitting heavier train loads and so utilizing to the best advantage the improved rolling stock now rapidly being placed on the Erie. This new cut-off is supplemental to that which cuts out the heavy grades in the vicinity of Middletown, where work on a double track freight line has already been begun,—this improvement to be completed at an estimated cost of $10,000,000.

The Francis H. Leggett reached San Francisco on Aug. 24, five and a half days from the Columbia river, with 1,400,000 ft. of lumber for San Pedro, and towing a large log raft 735 ft. long, with 55 ft. beam and drawing 23 ft. of water. The raft contains about 10,000,000 ft. of lumber. On reaching San Francisco the raft was turned over to a tug, the steamer proceeding on her way.

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BRITISH ADMIRALTY AND MOTOR BOATS

Liverpool, Sept. 4.—The announcement that I made in a recent letter that the British government was to make some important trials of the system of submarine signalling introduced by the Submarine Signal Co. of Boston, U. S. A., have taken place, and the performances promised by Mr. J. B. Millet, vice president of the company, who was present and explained the working of the apparatus, were fully attained. It is noteworthy that the remarks let fall by the naval officers present showed a keen appreciation of the possibilities of the system, and their more lively interest in the proceedings is doubtless to be explained by the fact that over and above the use to which a system of submarine signalling can be applied in connection with the mercantile marine, they foresee the possibility of its adoption to naval purposes unsuspected perhaps by the inventors. Among those present in addition to the Trinity house officials and representatives of the Admiralty were Sir William White, late chief constructor to the admiralty, and representatives of the leading British steamship companies.

The attention of the British admiralty is at present being seriously given to the motor-boat question. Important experiments are being carried out at the various dockyards in order to ascertain the type of boat, fuel and machinery most suitable for naval needs. It is now recognized that machinery requiring petroleum spirit in any form as fuel is impracticable for adaptation to naval needs. Petrol and alcohol are too highly inflammable for storage on a battleship. It is thought, however, that an efficient substitute may be found in the heavy oil which was tried and used for a time about eight years ago. The experiments, it is hoped, will show in what form of the oil the best results can be obtained. As regards the design of the boat, it is realized that such craft as those which have been taking part in the recent races are useless for naval purposes. A motor-boat to be of service to the navy, must be capable of putting to sea in almost any weather. Stoutness of construction is an all-important factor, not alone for the foregoing reason, but also because a boat must be of sufficient strength to stand the strain of being hoisted on board the larger ship even when a fairly heavy sea is running. Again, it is considered that none of the motor-boats manufactured by individual firms are of sufficient tonnage to carry a torpedo and its discharging gear. In this search for a suitable motor-boat for naval purposes the British admiralty is said not to be alone. A well known Thames shipbuilding firm has in hand certain experiments with motor-boats. Although the greatest reticence is being observed as to their nature and scope, there seems to be no doubt that their object is the same as that of those undertaken by the admiralty. In the event of their proving successful, there is little doubt that the results will be laid before the government officials.

An exceedingly good run with the American mails has been made by the North German Lloyd vessel, Kaiser Wilhelm II, which left New York (Sandy Hook) at 8:40 a. m. American time on Tuesday, Aug. 15, and passed Eddystone on Monday Aug. 21 at 2:55 a. m., reaching Plymouth at 3:58 a. m., giving an average speed of 23.01 knots per hour. The Great Western Railway Co., succeeded in transferring 1,013 bags of mail from the liner to the tender, then from the tender to the special train which arrived at Paddington at 9:23 a. m., the latter occupying just four hours for the journey of 247 miles, a remarkable example of the smart handling of mails now being done on this side.

The Berlin correspondent of the *Globe* says that the new vessel built by the Vulcan company at Stettin, for the Hamburg-American line, which is to be launched tomorrow, Aug. 29, in the presence of the Kaiser, will have a carrying capacity of 16,000 tons, as compared with 15,000 tons in the case of its sister ship the "America." In other respects the dimensions are the same, thus:—length, 700 ft., beam, 77 ft., draught, 54 ft., gross tonnage, 25,000 tons, displacement, 42,500 tons, engines of 17,200 H. P., and a speed of 18 knots. Each of these gigantic vessels will carry 550 first class, 300 second class, 250 third class, and 2,300 steerage passengers. Altogether these steamers will each carry 4,000 persons including officers and crew. There are five decks, one being given up to staterooms. A curiosity is supplied by the cabin windows, which are no longer the well-known portholes, but square glass windows, while the berths disappear, and their place is taken by roomy beds. In fact every thing has been done to reproduce on shipboard accommodations that lead one to fancy that one is in a hotel on land.

The Royal Steam Packet Co.'s steamer Severn will very shortly begin running in the new service between Britain and Cuba, which has been inaugurated by the company. The service will be a regular monthly one, the vessels engaged therein sailing from a British port and calling at Bilbao, Vigo and Corunna. The steamers will carry passengers and cargoes, and will compete only with the French and German lines. This latest service of the company is not their first association with Cuban trade, for some years ago their steamers traded to the then Spanish West Indian Colony.

The British firm of Messrs, Elder Dempster & Co., are also doing a great deal to foster trade between Canada and Mexico, by the new service of steamships which they have inaugurated between Halifax and Nassau in the Bahamas, as well as to Havana, Progresso, Vera Cruz, Tampico, etc. The Angola undertook the first sailing, and it is stated that she started with a full cargo and a fair number of passengers. At a luncheon given on board under the presidency of Mr. D. A. Campbell, (Messrs. Elder Dempster's Canadian representative), Mr. D. A. Ansell, Consul-General of Mexico, pointed out that Mexico could use large quantities of cereals such as Canada could supply, and she could also take all kinds of Canadian produce and manufactured goods. On the other hand, she could in return send to the Dominion sugar, hemp, coffee, woods and other products of a like nature. There is every prospect, in fact, of a most important freight and passenger trade being built up on this route.

S. T. E. Gibbons, third vice president and general counsel of the San Pedro, Los Angeles & Salt Lake railroad, sailed for Japan at the end of August. It is generally supposed that he will complete arrangements for a steamship line from San Pedro, the port of Southern California, to the Orient, and that the line will be controlled by Senator W. A. Clark and operated in connection with the Clark railroad. G. A. Parkyns, the assistant general freight and passenger agent of the Southern Pacific railway, sailed from San Francisco to Japan on the Mongolia in company with S. T. E. Gibbons.

A typhoon on July 17 sank more than a hundred craft in Japanese waters, causing the destruction of a pearl-fishing fleet and the loss of more than four hundred lives. The American ship A. G. Roper lost all her masts and spars, except the foremast and bowsprit, in a few minutes. The falling spars crushed in the roofs of the deck houses and made great holes in the decks. Fifteen boats and seventy-four men escaped from the typhoon.

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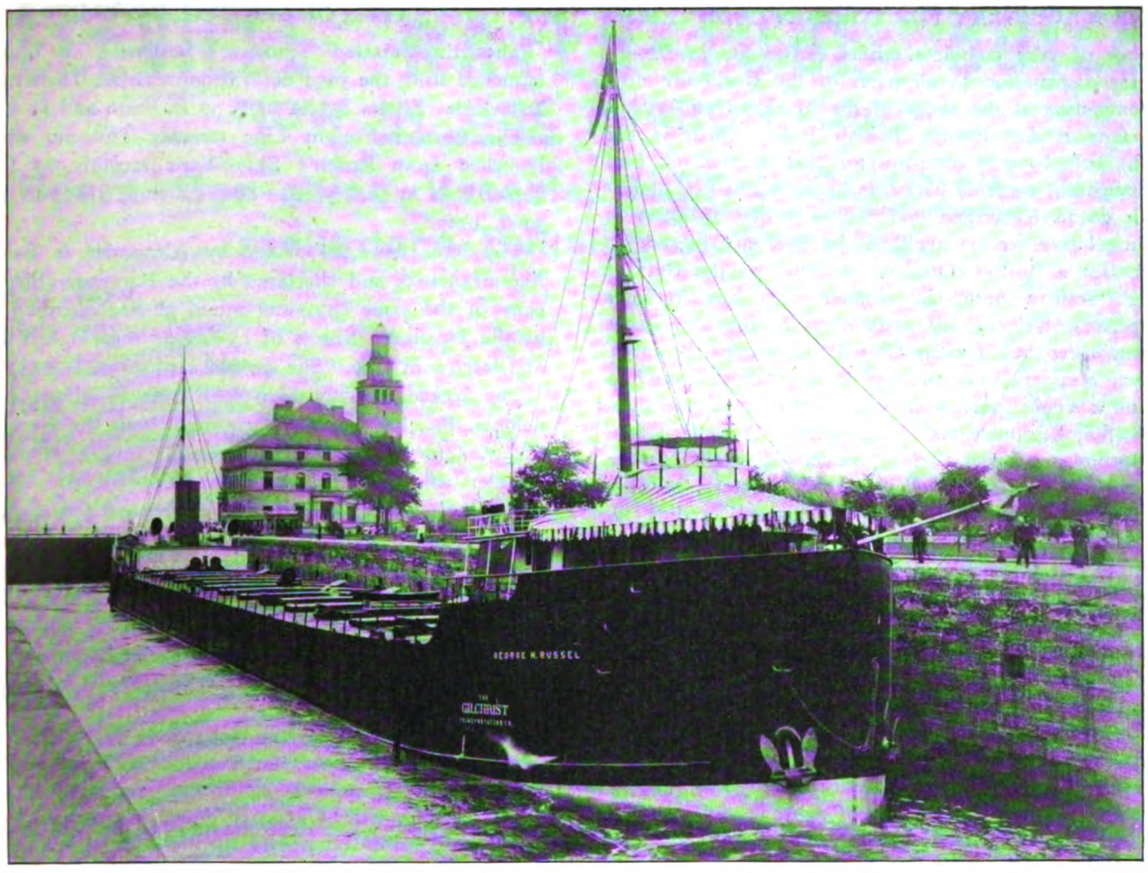

STEAMER GEORGE H. RUSSEL IN THE CANAL LOCK AT SAULT STE. MARIE.

WORK ON ERIE CANAL ENLARGEMENT

The State Canal Board has just finished plans for work on the 1,000-ton barge canal in course of the coming season, and State Engineer Van Alstyne has received report showing the progress to date under the six contracts already let for this gigantic undertaking. Mr. Van Alstyne said that work, including excavation, the construction of embankments and the removal of old buildings, was well under way on contracts Nos. 1, 2, 3 and 6, and that the plants for the prosecution of work on contracts Nos. 4 and 5 had been located.

Contract No. 1 provides for excavating the Hudson river channel from Northumberland to Fort Miller and from Crocker's reef to Fort Edward a distance of seven miles. Nearly an acre of land has been cleared near Crocker's reef, and 7,922 cubic yards of earth have been removed.

On contract No. 2, 28,325 cubic yards of earth were removed in August in the neighborhood of lock No. 3, near the Mohawk river, and a large number of buildings have been razed. Under contract No. 3, 37,060 cubic yards have been excavated near Ridge street, in Fort Miller, for the Champlain canal and 7,594 cubic yards of embankment have been placed.

Under contract No. 6, which includes work from a point just south of Buffalo road, west of Rochester, to near South Greece, embankments and inclines have been constructed for bridges. On the south side of the Spiere Bridge road a cut has been made about 45 ft. wide and 2,200 ft. long with an average depth of 9 ft.

For the systematic supervision of the canal work the state has established corps of engineers at fifteen different places along the 440 miles of projected work, extending from Albany to Buffalo, with spurs for the Champlain and Oswego canals, reaching to Lake Champlain at Whitehall and Lake Ontario at Oswego. At each of these so-called "residencies" the state employs a force of from ten to forty engineers, surveyors and levelers. All these men are under civil service and their salaries range up to $2,400. Just at present there is a scarcity of engineers, and a civil service examination has been held to establish a fresh eligible list. Altogether the state employs 350 men on the Barge canal work. This, of course, does not include the army of laborers and superintendents working for the contractors who perform the actual work of building the canal from plans prepared by the state authorities.

Work is about to begin on the first lock for the enlarged canal which will be constructed soon at Waterford, on the Champlain canal. The canal board recently decided to make all locks 45 ft. wide, instead of 28 ft. wide, as contemplated by the original plans.

The work now under way calls for an expenditure of between $5,000,000 and $6,000,000. Within the next two or three months the superintendent of public works will let contracts which will use up the rest of the $10,000,000 appropriation now at the disposal of the canal authorities. Before the work can advance beyond this point, the legislature must authorize the expenditure of another portion of the $101,000,000 estimated as the total cost of the improvement. The next legislature will be urged to make such an appropriation without delay.

Mexico is to have another steamship line to accommodate her rapidly increasing commerce. A contract has been entered into with an American company to provide regular service between Mobile and Lagoona del Carmen and Frontera, on the coast of the state of Tabasco. Each ship is to have a displacement of at least 1,000 tons, to maintain a speed of at least nine miles an hour and to provide first-class passenger accommodations. All ports on the Gulf coast, from the extreme northeast corner of the republic to the city of Frontera, will contribute to the business of the new line.

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MARINE MACHINERY FOR FOREIGN COUNTRIES

A number of very complete outfits of marine machinery (steam) for distribution to all parts of the world are now nearing completion at the shops of the Marine Iron Works, Chicago. One is for Burma, British India, which is the ninth outfit built by this company for that district. A fore and aft compound outfit is for shipment to Cuba and duplicates of it go to Nicaragua and Mexico. The company is also building heavy service tug boat machinery (fore and aft compound) for a Boston company operating on the Gulf of Mexico. A similar outfit in smaller size was recently shipped to New Orleans for installation in the new coast survey boat, being built for the United States engineer corps.

Two river steamers to be shipped in the "knock-down' to Bolivia, and a single screw deep water boat for similar shipment to the same country are also in course of construction.

A four-cylinder inboard surface condensing outfit for the new 100 ft. steel steamboat being built at Frontera, Mexico, by the Bushnell line (The Tabasco-Chiapas Trading & Transportation Co.) that is nearly a duplicate, but larger, of one of the last shipments made to them by this company.

For the Yaqui river in western Mexico, which is one of the difficult streams to navigate, the Marine Iron Works has just received an order for a very complete outfit for a vessel to ply in the merchandising and similar service.

These with some fore and aft compound condensing machinery for Montreal, Canada, and single screw outfits for the Amazon, together with a fair amount of work for nearby customers, makes the Marine Iron Works shops quite busy. It reports also a gratifying amount of work in sight for the winter months.

SHIP CONSTRUCTION DURING AUGUST

The bureau of navigation reports 107 sail and steam vessels of 44,028 gross tons were built in the United States and officially numbered during the month of August, 1905, as follows:

	WOOD				STEEL				TOTAL	
	Sail		Steam		Sail		Steam			
	No	Gross	No	Gross	No	Gross	No	Gross	No	Gross
Atlantic and Gulf	20	2,364	41	1,438	3	1,853*	5	7,947	69	13,602
Porto Rico	1	9	....	....	....	....	....	....	1	9
Pacific	1	8	7	520	....	....	....	....	8	528
Hawaii	....	....	....	....	....	....	....	....	....	....
Great Lakes	1	111	7	69	....	....	6	29,424	14	29,604
Western Rivers	....	....	15	285	....	....	....	....	15	285
Total	23	2,492	70	2,312	3	1,853	11	37,371	107	44,028

*Including 1 vessel, 135 gross, built of iron.

The largest vessels in this list were all lake-built, being the William A. Rogers, Peter White, Powell Stackhouse, William A. Paine and Superior.

MEAN STAGES OF WATER

The gauge records of the United States Lake Survey show the following mean stages of water above mean sea level, for August, 1905:

	Stages during August. Feet.	Higher than during same month last year. Feet.	Lower than during same month last year. Feet.	Higher than during August, 1895. Feet.	Lower than during August, 1895. Feet.
Lake Superior	603 21	0 26	....	0 26	.....
Lake Michigan	581 46	0 20	....	1.51	.....
Lake Huron	581 58	0 05	....	1 51	.....
Lake Erie	572 88	....	0 22	1 50	.....
Lake Ontario	246.78	....	0.78	2.52	.....

Present fall Lake Huron to Lake Erie, 0.27 ft. more than a year ago.

ITEMS OF GENERAL INTEREST

The three-masted schooner Stillman T. Kelley was launched from the yard of Washburn Bros., Thomaston, Me., last week. She is 173 ft. long, 37 ft. beam and 11 ft. deep.

The Chester Freight Line steamer Tinicum, which was launched from Roach's Ship Yard recently, is the 330th vessel built at that yard. The Tinicum is 152 ft. long and 30 ft. deep.

The bark Antrope, owned by Alexander & Baldwin, of San Francisco, and chartered by the Barneson-Hibberd company of the same city, was seized at Saghalien on Aug. 13 by the Japanese. She is of 1,486 tons register and was built at Glasgow in 1866. She carried a cargo of salt.

The Neafie & Levy Ship & Engine Building Co., Philadelphia, Pa., has secured a contract from the New England Fish Co. to build a steel steamer for fishing purposes. The steamer will be 142 ft. long, 24 ft. beam and 15 ft. deep and will have a triple expansion engine and Scotch boiler.

The steamer Montara, formerly the Willamette, owned by the Pacific Coast Steamship Co., while taking supplies to Russian fur-trading stations, was captured on Aug. 16 at Nikolski by the Japanese. She had made one round trip from San Francisco safely, bringing a rich cargo of furs. She was built in 1881 by J. Roach & Son at Chester, Pa., and is of 2,562 tons register.

The Maryland Steel Co., Sparrow's Point, Md., has received an order from the Panama Railroad Co. for six barges to be 111 ft. long, 24 ft. wide and 9 ft. deep. When completed they will be knocked down and shipped to Panama for service by the engineers of the railroad company. The Maryland Steel Co is also building two great car ferries for the New York, New Haven & Hartford Railroad Co.

The Union Gas Engine Co., of San Francisco, has sent a motor boat, which is said to be the fastest on the Pacific coast, to the Lewis and Clark Exposition at Portland, Ore. She is named Union, and is built of mahogany, with a 45 H. P. four-cylinder Union gas engine built by the Union Gas Engine Co. She is 45 ft. long and has a beam of 5 ft. On her trial trip in San Francisco Bay she made a speed of 20 miles an hour.

The manufacture of cotton fabrics is becoming an important industry in Japan, where much cotton-weaving machinery is being installed. When the Kangawa Maru left Kobe on her latest voyage to Seattle more than eighty vessels were at the docks or lying in port awaiting their turn to discharge their cargoes, consisting chiefly of cotton. Every warehouse along the water front at Kobe is crowded with cotton, which is also piled on the fields behind the town. Most of this cotton is American, though a little of it comes from India. A fire destroyed about two thousand bales, but the space which they had occupied was filled almost at once by other bales discharged from the vessels in port.

Anxious to win the world's championship trophy, Alexander Winton has entered the motor boat carnival, to be held on the Hudson river, Sept. 14, 15 and 16, and will go to New York with the Winton boat, which is owned jointly by himself and Lewis R. Speare, president of the Bay State Automobile Association of Boston. Another notable entry made with Secretary Gambel was the Oldsmobile racer called the "Six Shooter," which is owned by F. L. Smith of Lansing, Mich. There is every indication that the carnival will be the greatest motor boat event ever held in this country. As the start will be at a point just off West Ninety-seventh street, there will be an excellent opportunity for every one to see the fast boats competing for the various trophies. The high-speed course will be 10 nautical miles to the lap, and the turns will be almost a half mile oval. The course for the smaller boats is triangular, six and one-half nautical miles to the lap.

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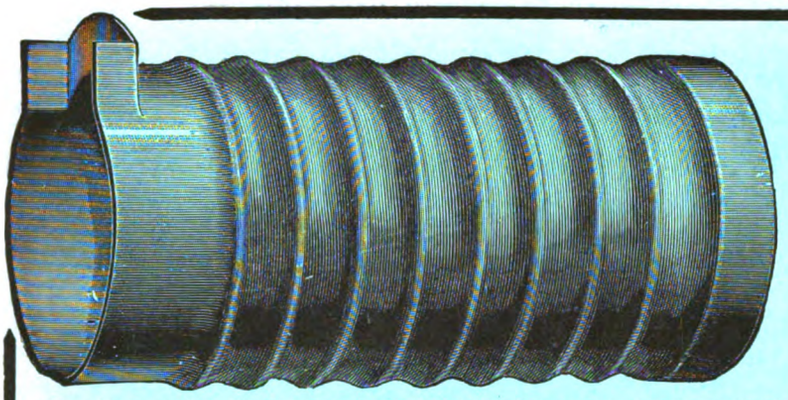

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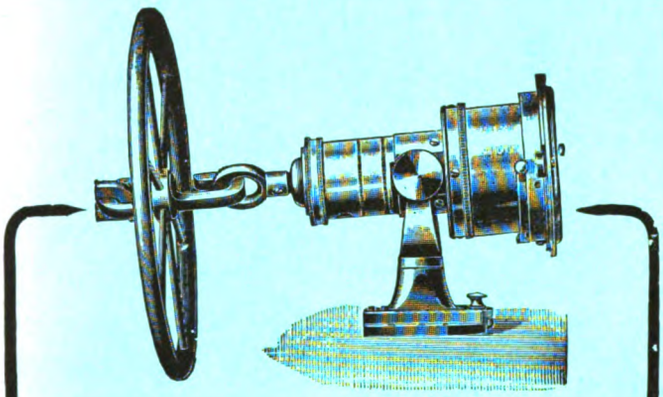

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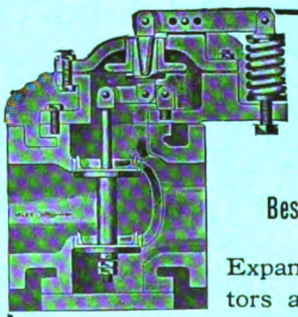

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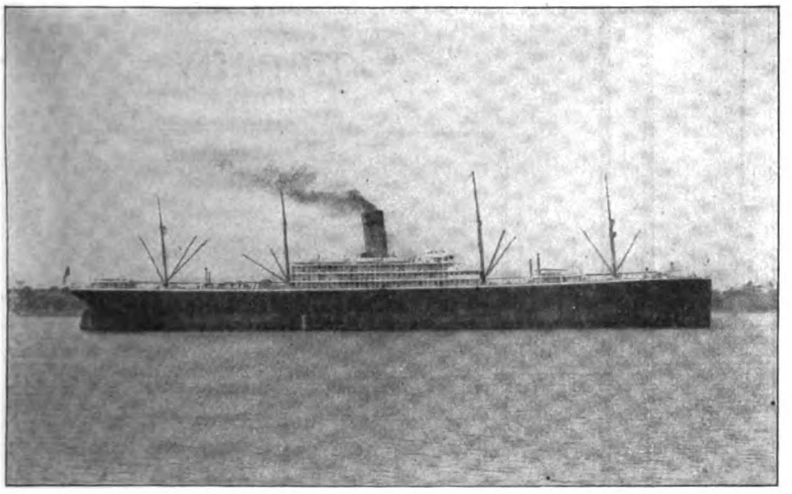

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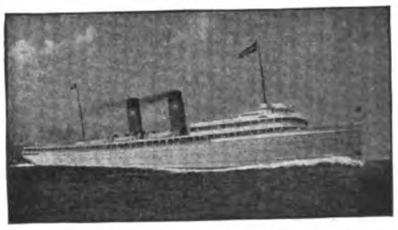

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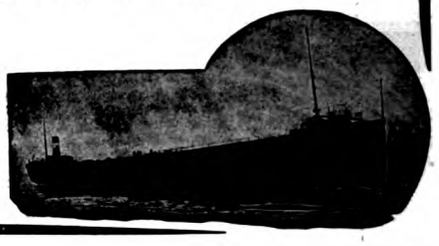

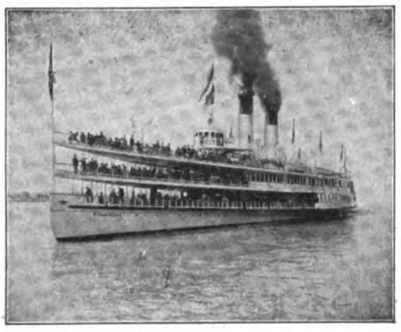

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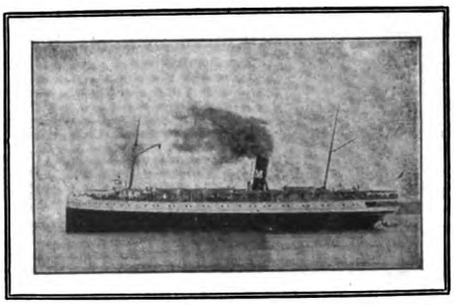

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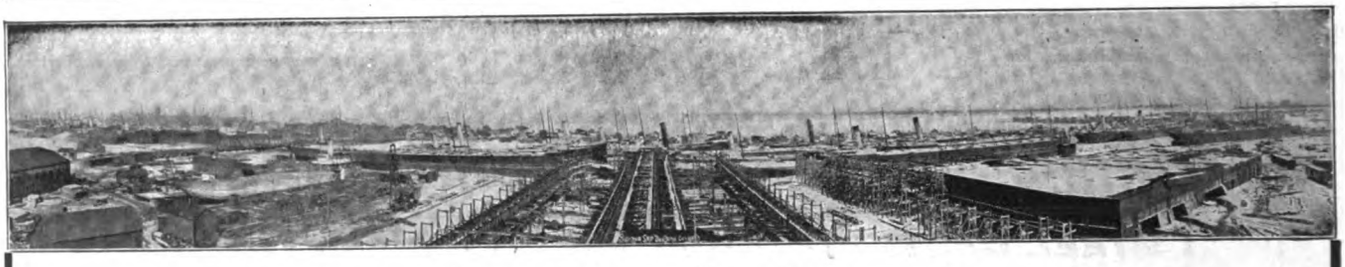

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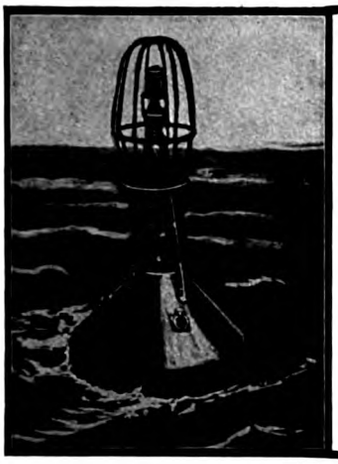

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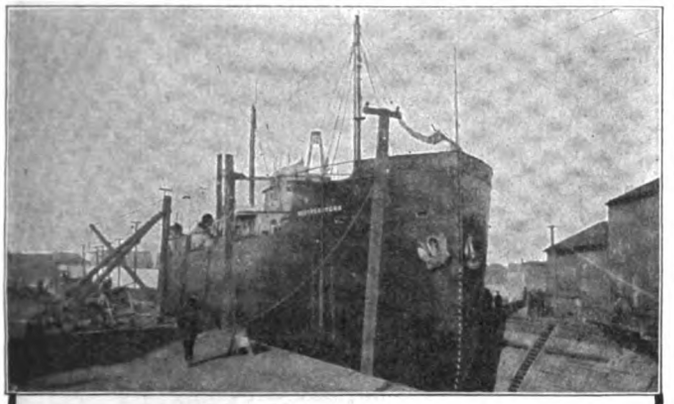

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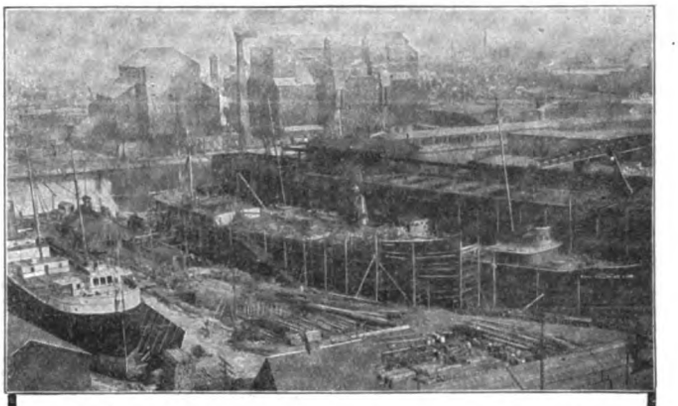

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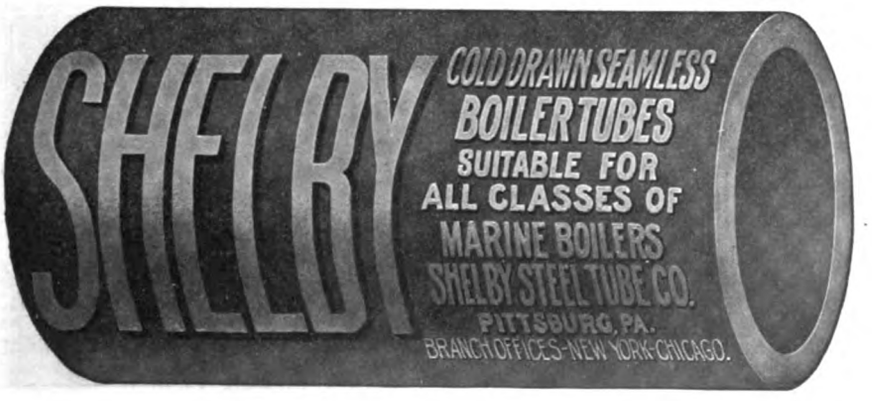

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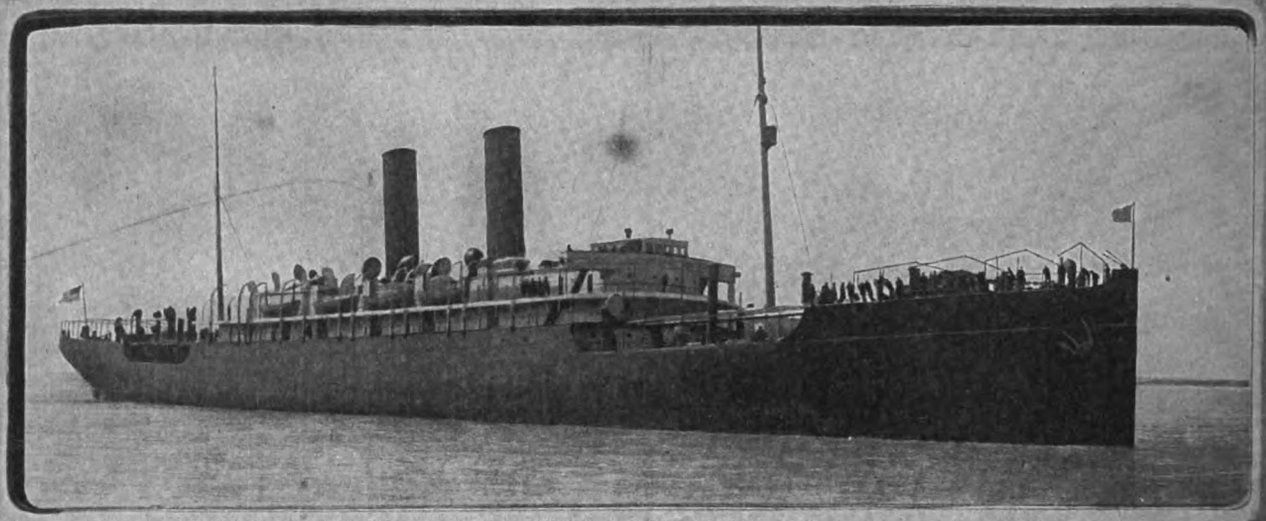

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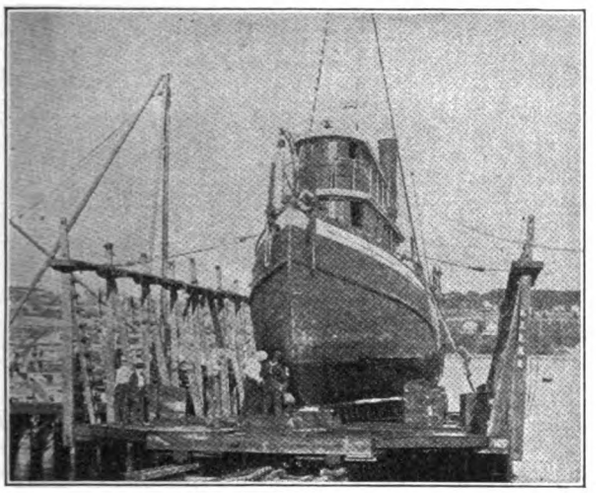

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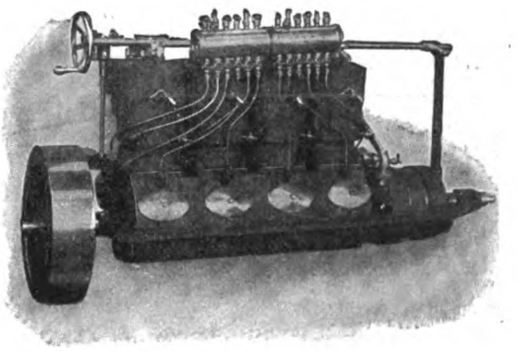

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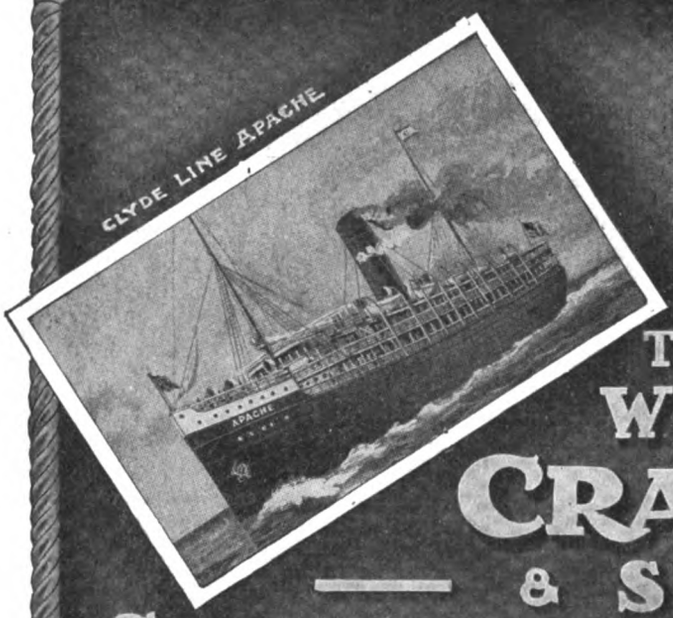

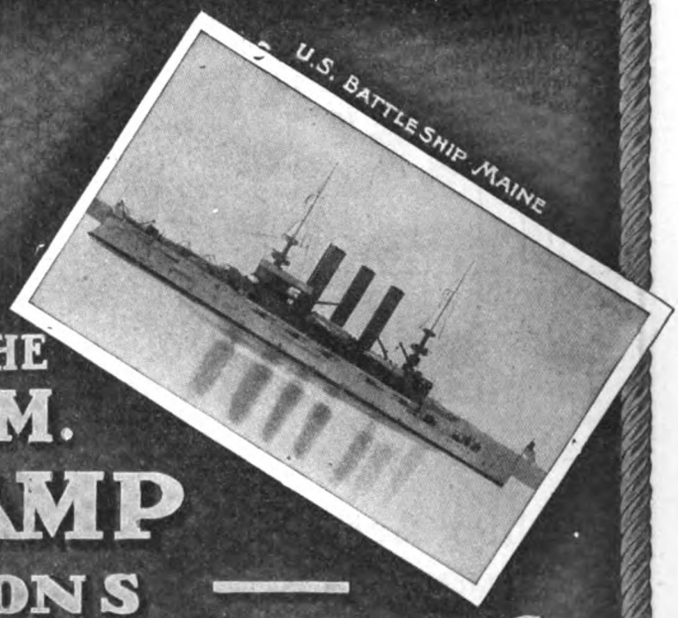

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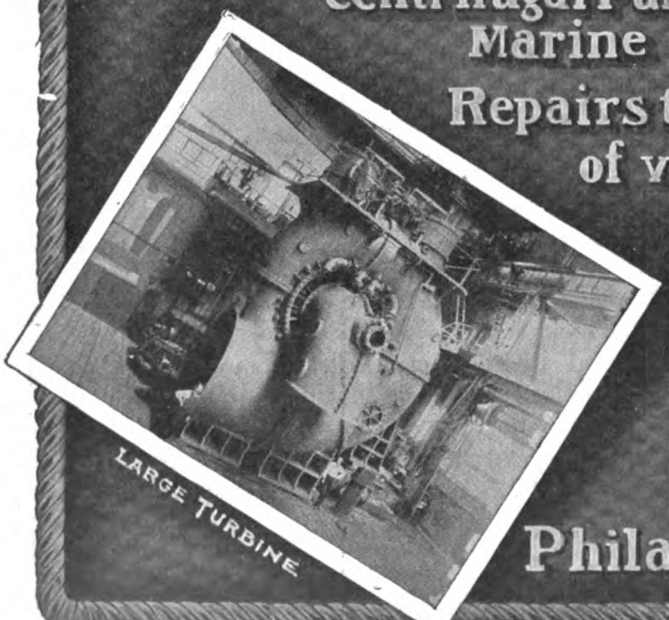

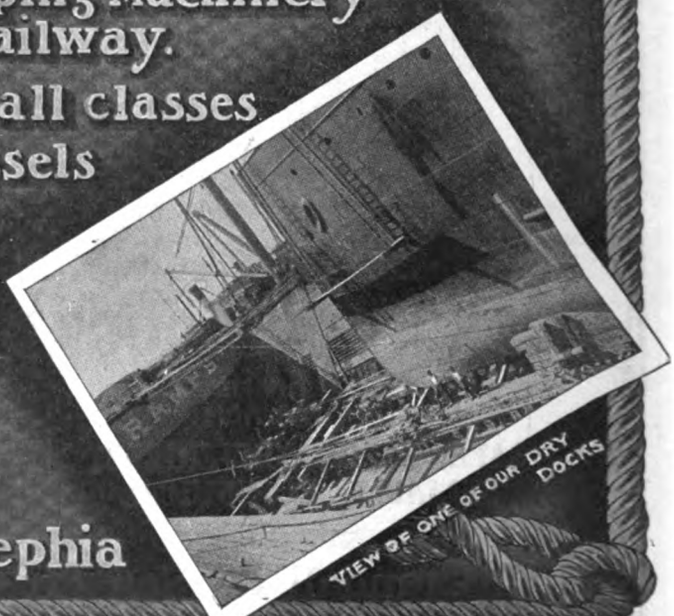

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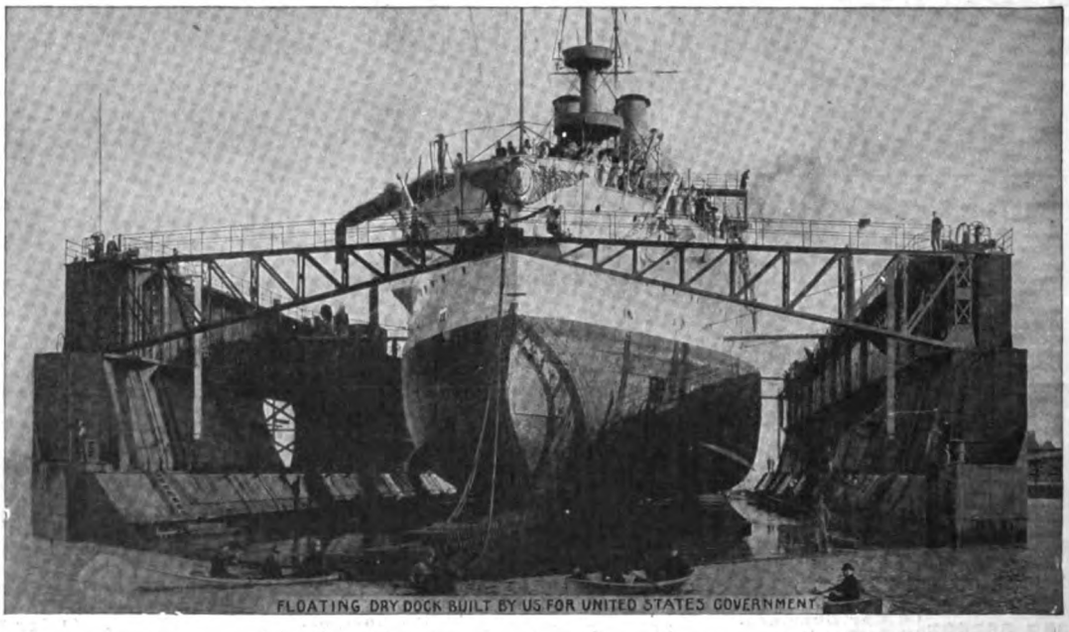

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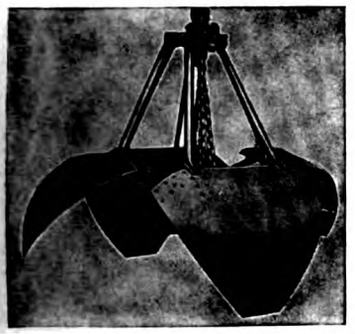

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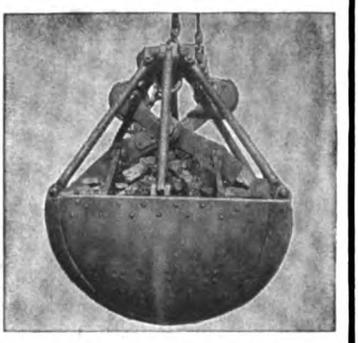

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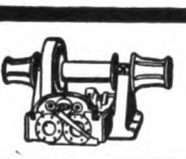

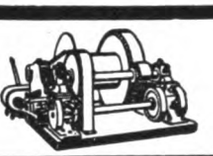

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SHIPS — ENGINES — BOILERS
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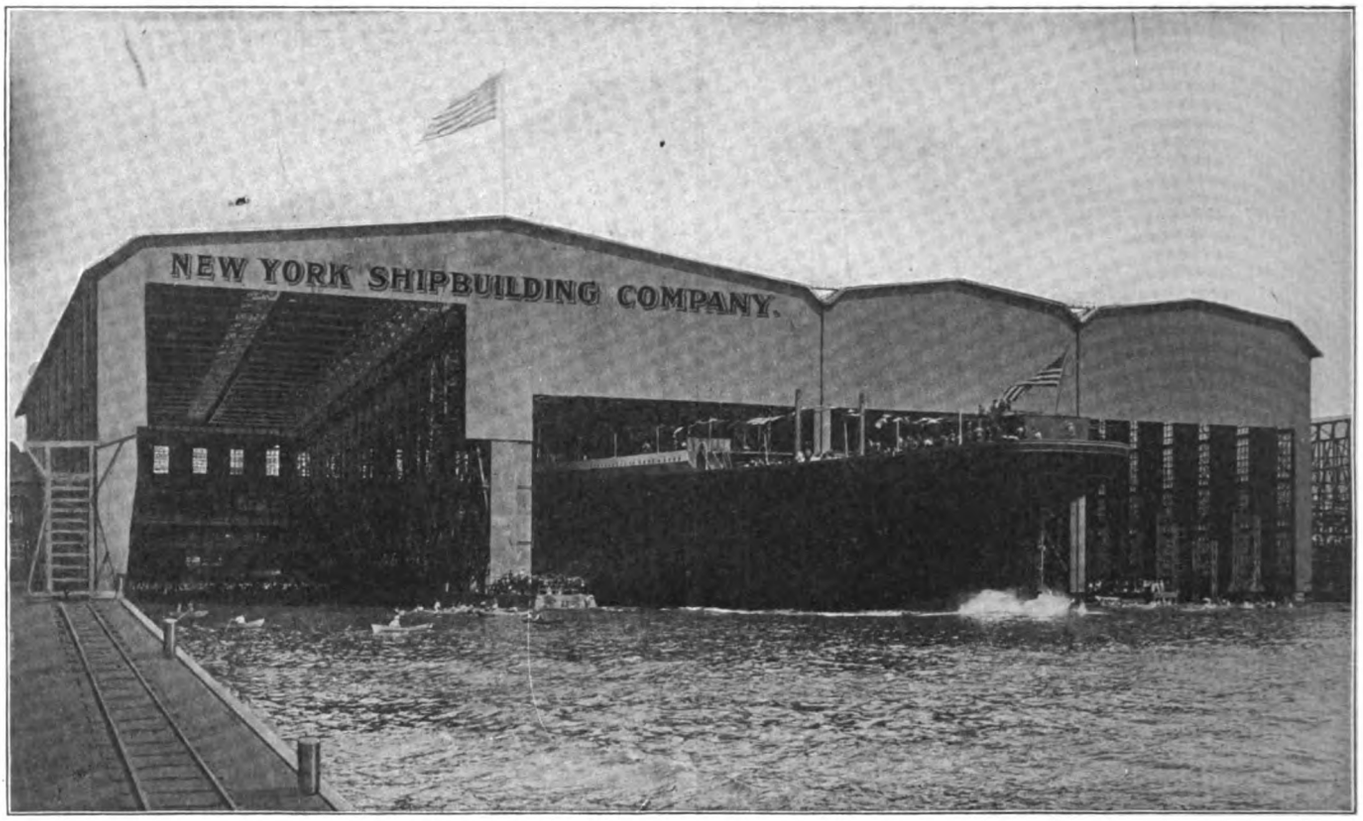

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A STORY OF THE LAKE SUPERIOR IRON COUNTRY

THIS book relates in biographical form the development of the iron mines of the Lake Superior region.

Untold hardships were visited upon the pioneers in the iron country.

First of all, they tried to make iron in the upper peninsula of Michigan and failed; then they began carrying the ore in sleighs to the shore of Lake Superior and portaging it over the falls of St. Mary's river; every step was attended with difficulty and expense; then it proved refractory in the early blast furnaces of Pennsylvania and plunged them all in doubt as to its commercial value.

Peter White assisted in stripping the first iron mine; he wrote the bill of lading of one of the earliest shipments of ore—six barrels; and he is still an active force in this great iron region, though shipments have now reached 30,000,000 tons annually.

The Hon. Peter White.

The book, while founded on fact, is an industrial romance. It was undertaken to preserve the history of the development of the great iron country while it was yet possible to secure the facts from the very men who wrought it.

Coincident with the exploitation of the iron mines, is traced the growth of the ship and the development of loading and unloading equipment. It used to take four days to unload 350 tons; now 10,000 tons are unloaded in four hours.

The book is handsomely illustrated; attractively bound in cloth; size 9¼ x 7¼ inches, and printed on a high grade stock of India tint paper. Price $1.50 net, postage 15c.

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THE PENTON PUBLISHING CO.

Cleveland

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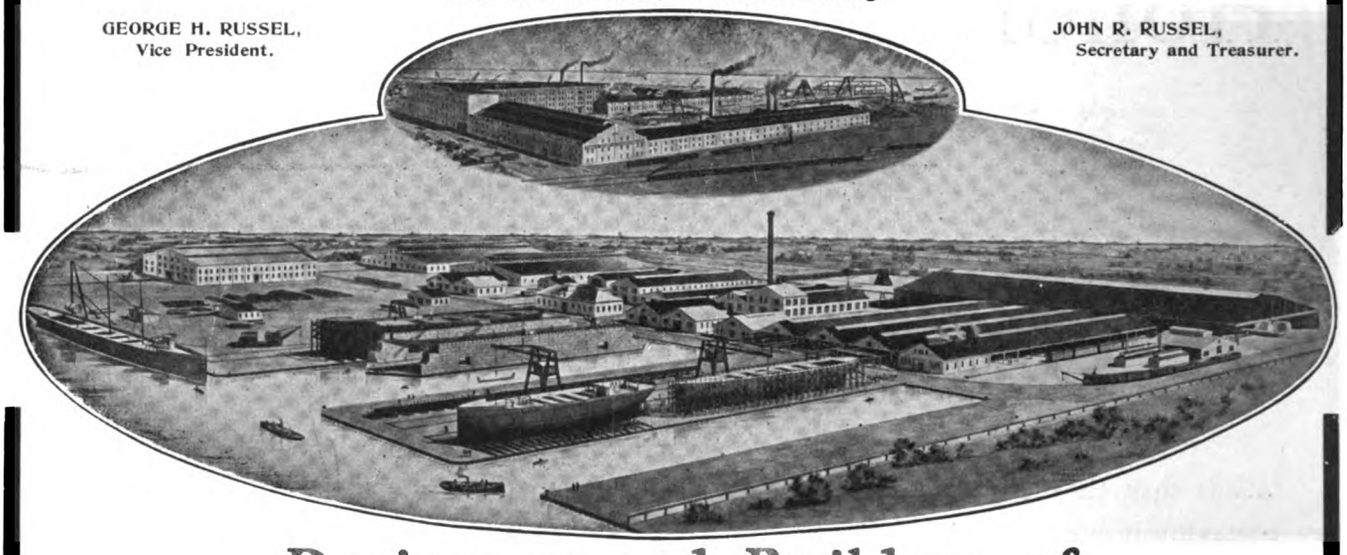
DETROIT, MICH.

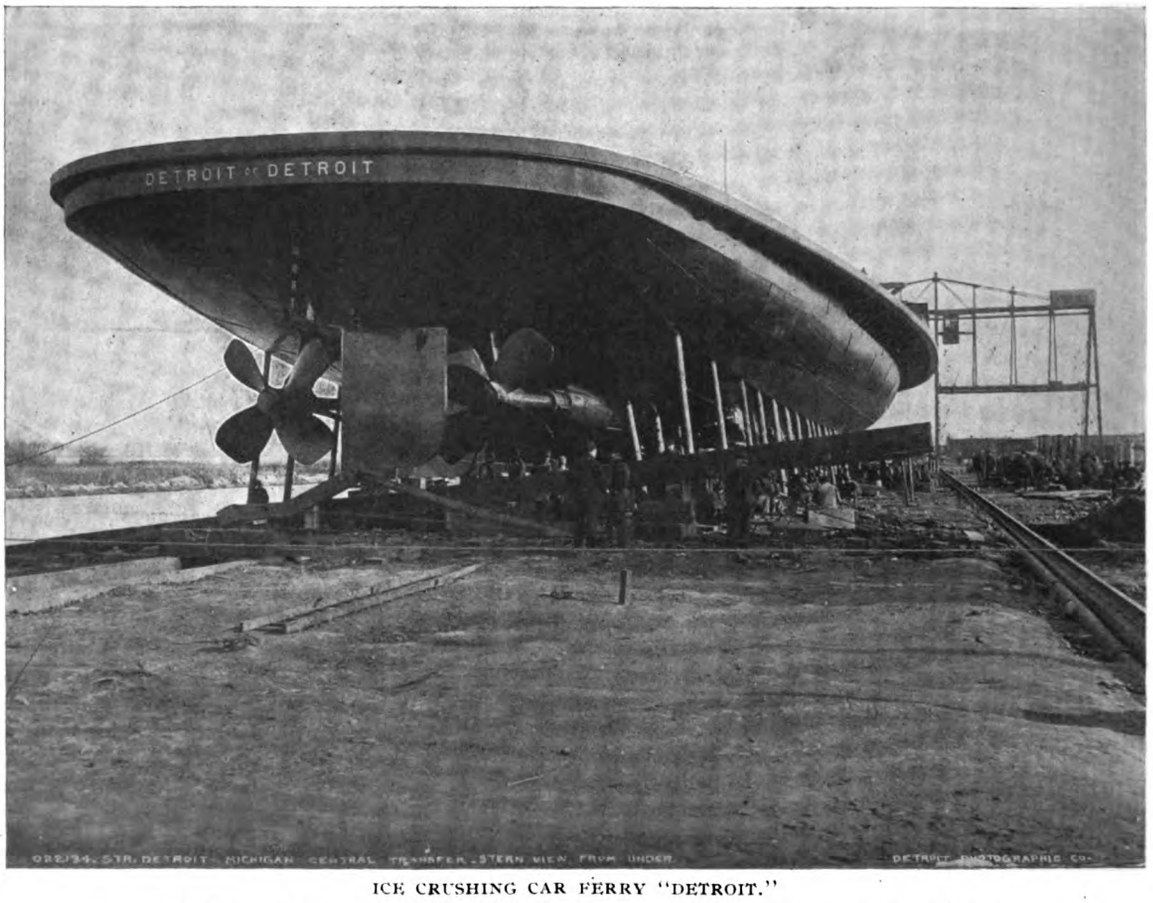
ANTONIO C. PESSANO, President and Gen. Mgr.

GEORGE H. RUSSEL, Vice President.

JOHN R. RUSSEL, Secretary and Treasurer.



Designers and Builders of Steel Freight and Passenger Ships. Marine Engines. = Hydraulic Dredges.



ICE CRUSHING CAR FERRY "DETROIT."

Marine Repairs a Specialty.

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French Navy	360,560 H. P.
English Royal Navy	966,300 "
Russian Imperial Navy	253,800 "
Japanese Imperial Navy	122,700 "
Austrian Imperial Navy	56,700 "
Italian Royal Navy	32,500 "
Chilian Navy	26,500 "
Argentine Navy	13,000 "
The "Messageries Maritimes" Company	87,600 "
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500 "
Compagnie Generale Transatlantique	1,500 "
Total Horse Power of Boilers in Use	1,939,660

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Geo. L. McCurdy

169 Jackson Boulevard

CHICAGO ILLINOIS

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DIRECT REPRESENTATIVE OF LEADING AMERICAN AND FOREIGN UNDERWRITERS

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Buyers' Directory of the Marine Trade

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by The Marine Review, Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.
Great Lakes Engineering Works.....Detroit.
Mietz, Aug. .....New York.

AIR PORTS, DEAD LIGHTS, ETC.
Marine Mfg. & Supply Co.....New York.

AIR PUMPS AND APPLIANCES.
Fore River Ship & Engine Co..Quincy, Mass.
Great Lakes Engineering Works.....Detroit.

ANCHORS.
Bowers, L. M. & Co.....Binghamton, N. Y.

ANTI-FRICTION METALS.
Cramp, Wm. & Sons.....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.
American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit
Great Lakes Engineering Works.....Detroit
Sturtevant, B. F., Co.....Hyde Park, Mass.

ASH EJECTORS.
Great Lakes Engineering Works.....Detroit.

ATTORNEYS AND PROCTORS IN ADMIRALTY.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Jenkins, Russell & Eichelberger....Cleveland.
Kremer, C. E.....Chicago.
MacDonald, Ray G.....Chicago.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon Cleveland

BAROMETERS, MARINE GLASSES, ETC.
Ritchie, E. S. & Sons.....Brookline, Mass.

BELT CONVEYORS.
Link Belt Machinery Co.....Chicago.

BLOCKS, SHEAVES, ETC.
Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.
Power Specialty Co.....Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot....Long Island City, N. Y.
Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P. & Co. Winthrop Harbor, Ill.

BOILER CLEANING DEVICE.
Power Specialty Co.....Detroit.

BOILER COMPOUNDS.
Dearborn Drug & Chemical Works....Chicago.

BOILER MANUFACTURERS.
Almy Water Tube Boiler Co..Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit.
Delauney, Belleville & Co...St. Denis, France.
Detroit Ship Building Co.....Detroit.
East End Boiler Works.....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Works....
.....Oswego, N. Y.
Marine Iron Works.....Chicago.
Maryland Steel Co.....Sparrows Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Boiler Co....New York.
Newport News Ship Building Co.....
.....Newport News, Va.

BOILER MANUFACTURERS—Continued.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co....
.....Duluth, Minn.
Quintard Iron Works Co.....New York.
Roberts Safety Water Tube Boiler Co....
.....New York.
Stirling, The Co.....New York.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.

BOILER RIVETS.
Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co..Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.
Cramp, Wm. & Sons.....Philadelphia.
Fore River Ship & Engine Co..Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Lunkenheimer Co.....Cincinnati.
Macbeth Iron Co.....Cleveland.

BRIDGES, BUILDERS OF.
Cowing, John P.....Cleveland.
Scherzer Rolling Lift Bridge Co.....Chicago.

BUCKETS, ORE AND COAL.
Brown Hoisting & Conveying Machine Co.
..... Cleveland.
McMyler Mfg. Co.....Cleveland.
Mayo & Bailey .....Chicago.

BULKHEAD DOORS, WATERTIGHT.
"Long Arm" System Co.....Cleveland.

CABIN AND CABINET FINISHING WOODS.
Martin-Barriss Co.....Cleveland.

CANVAS SPECIALTIES.
Baker & Co., H. H.....Buffalo.
Bunker, E. A. .....New York.
Upson-Walton Co.....Cleveland.

CAPSTANS.
American Ship Windlass Co..Providence, R. I.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

CEMENT, IRON FOR REPAIRING LEAKS.
Smooth-On Mfg. Co.....Jersey City, N. J.

CHAINS.
Woodhouse Chain Works.....Trenton, N. J.

CHAIN CONVEYORS, HOISTS.
Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
General Electric Co.....Schenectady, N. Y.

CHAIN HOISTS.
Boston & Lockport Block Co....Boston, Mass.

CHARTS.
Penton Publishing Co.....Cleveland.
Potter, J. D.....London.

CLOCKS (Marine and Ship's Bell) AND CHRONOMETERS.
Ashton Valve Co.....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.
Hanna, M. A. & Co.....Cleveland.
Ironville Dock & Coal Co.....Toledo, O.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.

COAL AND ORE HANDLING MACHINERY.
Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
Link Belt Machinery Co.....Chicago.
McMyler Mfg. Co.....Cleveland.

COMPASSES.
Ritchie, E. S. & Sons.....Brookline, Mass.

COMPASS CORRECTORS.
How, Benj. V..... Boston.

CONDENSERS.
Great Lakes Engineering Works.....Detroit.
Thropp & Sons Co., John E...Trenton, N. J.

CONTRACTORS FOR PUBLIC WORKS.
Breymann & Bros., G. H.....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Hubbell Co., H. W.....Saginaw, Mich.
Lake Superior Contracting & Dredging Co.,
..... Duluth, Minn.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M.....Detroit.

CORDAGE.
Baker & Co., H. H.....Buffalo.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.
Armstrong Cork Co.....Pittsburg, Pa.
Kahnweiler's Sons, D.....New York.

CRANES, TRAVELING.
Brown Hoisting Machinery Co.....Cleveland.
McMyler Mfg. Co.....Cleveland.

DIVING APPARATUS.
Morse, A. J. & Son.....Boston.
Schrader's Son, Inc., A..... ... New York.

DRAFT, MECHANICAL.
Sturtevant Co., B. F.....Hyde Park, Mass.

DREDGING CONTRACTORS.
Breymann & Bros., G. H.....Toledo.
Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Great Lakes Dredge & Dock Co.....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Hubbell Co., H. W.....Saginaw, Mich.
Lake Superior Contracting & Dredging Co.
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Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M.....Detroit.

DREDGING MACHINERY.
Quintard Iron Works Co.....New York.

DRYING APPARATUS.
Sturtevant, B. F. Co.....Hyde Park, Mass.

DRY DOCKS.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....Chicago.
Craig Ship Building Co.....Toledo, O.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works.....Detroit.
Lockwood Mfg. Co.....East Boston, Mass.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Shipowners Dry Dock Co.....Chicago.
Superior Ship Building Co....Superior, Wis.
Tietjen & Lang Dry Dock Co.....Hoboken, N. J.

DREDGE BUILDERS.
Manitowoc Dry Dock Co.....Manitowoc, Wis.

DYNAMOS.
General Electric Co.....Schenectady, N. Y.
Mietz, Aug.....New York.
Sturtevant, B. F. & Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.

ECONOMIZERS, FUEL.
Sturtevant Co., B. F.....Hyde Park, Mass.

ELECTRIC HOISTS AND CRANES.
General Electric Co.....Schenectady, N. Y.

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WANTED and FOR SALE Department.

PROPOSALS.

U. S. ENGINEER OFFICE, Duluth, Minn., Aug. 19, 1905. Sealed proposals for U. S. Engineer Building at Duluth, Minn., will be received here until noon, Sept. 18, 1905, and then publicly opened. Information on application. CHAS. L. POTTER, Major Engrs. Sept. 14.

U. S. ENGINEER OFFICE, 57 Park St., Grand Rapids, Mich., Aug. 21, 1905. Sealed proposals for repair of Pier and Revetments at Charlevoix, Mich., will be received here until 3 p.m., Sept. 20, 1905, and then publicly opened. Information furnished on application. M. B. ADAMS, Col. Engrs. Sept. 14.

U. S. ENGINEER OFFICE, 57 Park St., Grand Rapids, Mich., Sept. 4, 1905. Sealed proposals for extension of Piers at Holland (Black Lake), Mich, will be received here until 3 p m., October 4, 1905, and then publicly opened. Information furnished on application. M. B. ADAMS, Col. Engrs. Sept. 28

U. S. ENGINEER OFFICE, 57 Park St., Grand Rapids, Mich., Sept. 11, 1905. Sealed proposals for construction and repair of piers at Muskegon, Mich., will be received here until 3 p. m., Oct. 11, 1905, and then publicly opened. Information furnished on application. M. B. ADAMS, Col. Engrs. Oct. 5.

FOR SALE.

FOR SALE $3500.00.

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FOR SALE.

FOR SALE.

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Hull 38½ ft. long and 8½ ft. beam. Built very heavy and in the best manner possible. Keel 5¼ in. x 10½ in. Frames 2 in. x 3 in. at bottom and 2 in x 2 in. at top.

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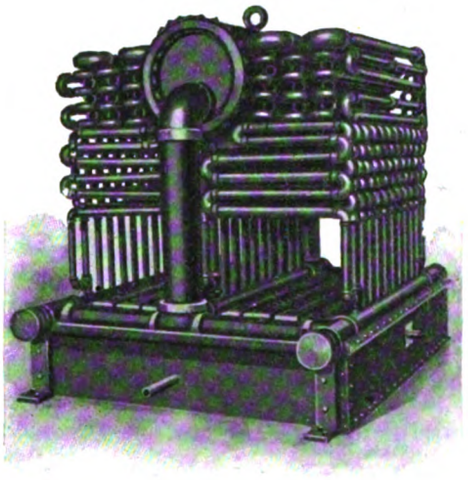

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ANY SIZE OUTSIDE OR INSIDE DIAMETER.
AVERAGE LENGTH OF HOLLOW BARS EIGHT TO TEN FEET.
STAYBOLT BARS
BOTH HOLLOW AND SOLID,
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL IRON OR STEEL.
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Makers of only the Highest Quality of Staybolt Material, in Hollow and Solid Bars, from the Best Double-Refined Charcoal Iron or Steel.

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Buyers' Directory of the Marine Trade.—*Continued.*

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General Electric Co.....Schenectady, N. Y.
Mietz, Aug. .....New York.
Sturtevant, B. F. & Co.....Hyde Park, Mass.
Thropp & Sons, John E.....Trenton, N. J.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Chicago Ship Building Co.....Chicago.
Chase Machine Co.....Cleveland.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Detroit Ship Building Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Shipbuilding Co....Quincy, Mass.
Great Lakes Engineering Works.Detroit, Mich.
Hall Bros. .....Philadelphia.
Lockwood Mfg. Co.....East Boston, Mass.
Marine Iron Works.....Chicago.
Maryland Steel Co.....Sparrows Point, Md.
Mietz, Aug.....New York.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher, Chas. D.....New York.
Moulton Steering Engine Co.....New York.
Newport News Ship Building Co.....
.....Newport News, Va.
New York Shipbuilding Co....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co...
..... Duluth, Mich.
Quintard Iron Works Co.....New York.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co....Superior, Wis.
Thropp, J. E. & Sons Co.....Trenton, N. J.
Trout, H. G.....Buffalo.

ENGINE BUILDERS, STEAM.

Sturtevant Co., B. F.....Hyde Park, Mass.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
Marine Mfg. Supply Co.....New York.

ENGINE TESTING.

Parsons, Ralph M.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. .....Chicago.
Kieley & Mueller .....New York.
Lunkenheimer Co. .....Cincinnati.
Northwestern Steam Boiler & Mfg. Co...
..... Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander .....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph.....Duluth, Minn.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Roelker, H. B. .....New York.
Wood, W. J. .....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.

Greacen-Derby Engineering Co.....
.....Perth Amboy, N. J.
Ross Valve Co.....Troy, N. Y.

FIRE EXTINGUISHERS.

Safety Fire Extinguisher Co.....New York.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.

FORGES.

Sturtevant, B. F. Co.....Boston.
Sutton Co., C. E.....Toledo, O.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co...Cleveland.
Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

FUEL ECONOMIZERS.

Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
Ironville Dock & Coal Co.....Toledo, O.
Parker Bros. Co., Ltd.....Detroit.
Pickands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co.....Detroit.
Smith Coal & Dock Co., Stanley B. Toledo, O.

FUELING PLANTS, BUILDERS OF

Link Belt Machinery Co.....Chicago.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.

Ashton Valve Co.....Boston.
Lunkenheimer Co. .....Cincinnati.

GAUGES, WATER.

Bonner Co., Wm. T.....Boston.
Lunkenheimer Co. .....Cincinnati, O.

GENERATING SETS.

Sturtevant Co., B. F.....Hyde Park, Mass.
General Electric Co.....Schenectady, N. Y.

GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J

GREASE EXTRACTORS.

Greacen-Derby Engineering Co.....
.....Perth Amboy, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.
Sutton Co., C. E.....Toledo, O.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....
.....Midland, Ont.
Hyde Windlass Co.....Bath, Me.
McMyler Mfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Mietz, Aug. .....New York.

HOLLOW SHAFTINGS, IRON OR STEEL.

Falls Hollow Staybolt Co...Cuyahoga Falls, O.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co...Cuyahoga Falls, O.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co.....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Elphicke, C. W. & Co.....Chicago.
Fleming & Co., E. J.....Chicago.
Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F..New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

IRON CASTINGS.

Sutton Co., C. E.....Toledo, O.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland, O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong, Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Gaynor, T. F .....New York.
Kahnweiler's Sons, D.....New York.
National Cork Co.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson .....Buffalo.

LOGS.

Nicholson Ship Log Co.....Cleveland.
Walker & Sons, Thomas....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J.

LUBRICATORS.

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Lunkenheimer Co. .....Cincinnati

LUMBER.

Martin-Barriss Co.....Cleveland.
Rayner, J. .....Chicago.

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Fogg, M. W.....New York.

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Great Lakes Engineering Works.....Detroit.
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Katzenstein, L. & Co.....New York.

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Ritchie, E. S., & Sons.....Brookline, Mass.

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Nacey, James .....Cleveland.
Wood, W. J. .....Chicago.

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Stratford, Oakum Co.....Jersey City, N. J.

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Mietz, Aug. .....New York.

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Standard Oil Co.....Cleveland.

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Jenkins Bros. .....New York.
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Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co. .....Cleveland.

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Iron mining companies, Lake Superior region, addresses of mines, owners, sales agents, etc.
Iron mining industry, Lake Superior region.
Iron mining ranges of Lake Superior, map of.
Iron ore analyses.
Iron ore carriers, capacities.
Iron ore, output from Lake Superior by mines and ranges.
Iron ore, receipts at Lake Erie docks and shipments to furnaces.
Iron ore shipping docks, particulars of.
Iron ore sales agents handling Lake Superior product.
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Pig iron, world's production of.
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Great Lakes Dredge & Dock Co.....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Hubbell Co., H. W.....Saginaw, Mich.
Lake Superior Contracting & Dredging Co. ..... Duluth, Minn.
Parker Bros. Co., Ltd.....Detroit.
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Starke Dredge & Dock Co., C. H..Milwaukee.
Sullivan, M..... Detroit

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Crane Co. .....Chicago.
Macbeth Iron Co.....Cleveland.
Reading Iron Co.....Reading, Pa.

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Roelker, H. B.....New York.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co....Superior, Wis.
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Trout, H. G.....Buffalo.

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Marine Iron Works.....Chicago.
Kingsford Foundry & Machine Works... .....Oswego, N. Y.

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RANGES.

Stamford Foundry Co.....Stamford, Conn.

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Roelker, H. B.....New York.

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Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

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Upson-Walton Co.....Cleveland.

SALVAGE COMPANIES.

See Wrecking Companies.

SEARCH LIGHTS.

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Falls Hollow Staybolt Co..Cuyahoga Falls, O.

SHEARS.

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Maryland Steel Co.....Sparrows Point, Md.
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Newport News Ship Building Co..... .....Newport News, Va.
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Russell & Watson.....Buffalo.

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McCarthy, T. R.....Montreal, Can.

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Boston Steamship Co.....Boston.
Cleveland & Buffalo Transit Co.....Cleveland.
International Mercantile Marine Co..... ..... Philadelphia.
Mallory Line ....New York.
Merchants' Montreal Line.....Montreal.
New York & Cuba Mail S. S. Co...New York.
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Sutton Co., C. E.....Toledo, O.

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Chase Machine Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
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Marine Mfg. & Supply Co.....New York.
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Sheriffs Mfg. Co.....Milwaukee.

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Schrader's Son, Inc., A..... ....New York.

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Gaskin, Edward .....Buffalo.
Hynd, Alexander .....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Nacey, James .....Cleveland.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co.....Chicago.
Lunkenheimer Co.....Cincinnati, O.

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Atlantic Works, Inc.....Philadelphia.

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American Ship Windlass Co..Providence, R. I.
Chase Machine Co.....Cleveland.

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Great Lakes Towing Co.....Cleveland.

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TRUCKS.

Boston & Lockport Block Co.....Boston.

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Shelby Steel Tube Co.....Pittsburg, Pa.

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Crane Co. .....Chicago.
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Detroit White Lead Works.....Detroit.
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Hall, John B.....Buffalo.
Helm & Co., D. T.....Duluth.
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel .....New York.
Hutchinson & Co.....Cleveland.
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McCarthy, T. R.....Montreal.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

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Lunkenheimer Co.....Cincinnati, O.

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American Ship Building Co.....Cleveland.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

WINCHES.

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Georgian Bay Engineering Works..... .....Midland, Ont.
Hyde Windlass Co.....Bath, Me.

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Atlantic Works, Inc.....Philadelphia.

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Rayner, J. .....Chicago.

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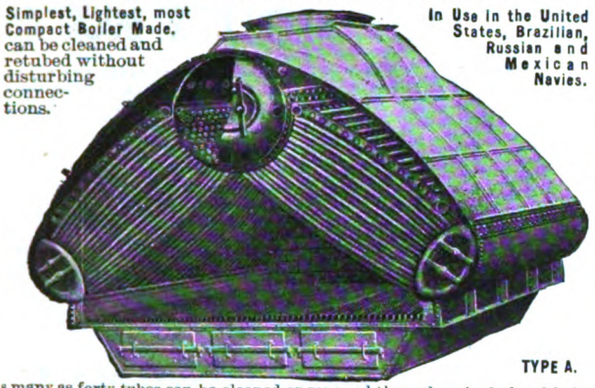

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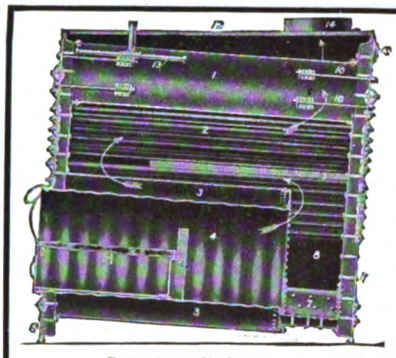

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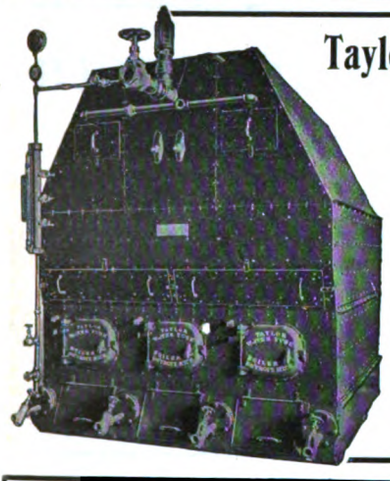

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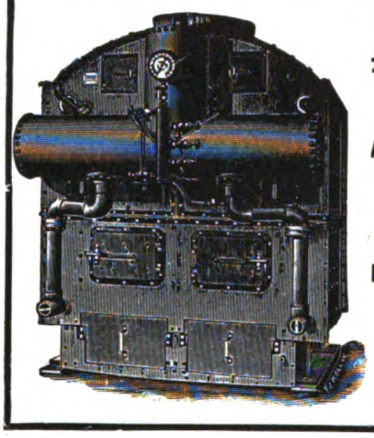

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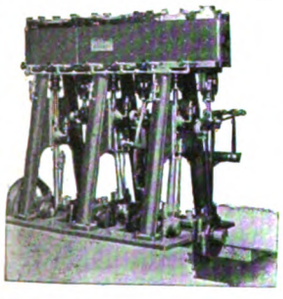

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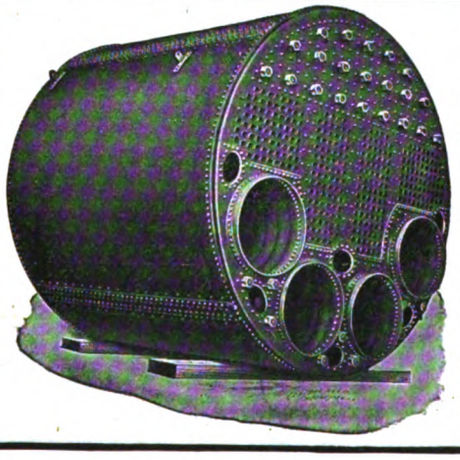

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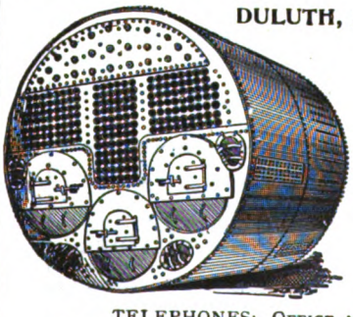

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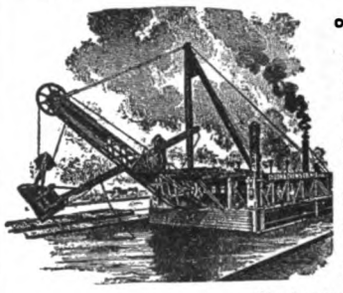

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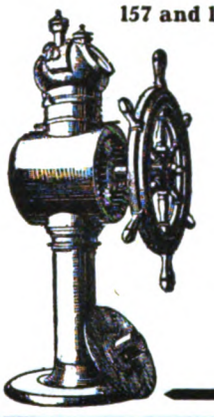
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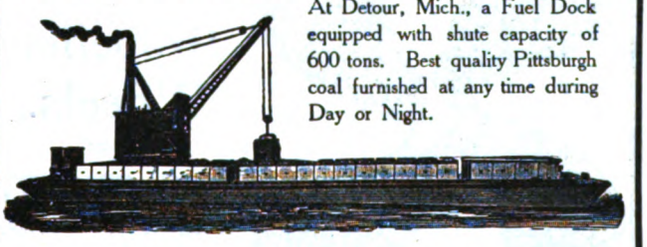
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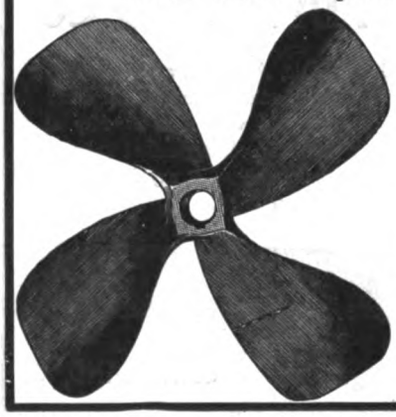

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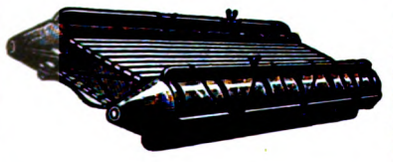

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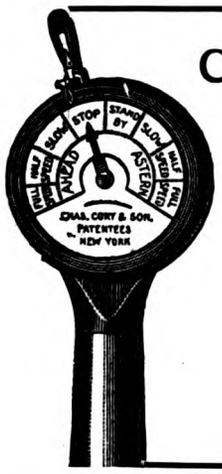

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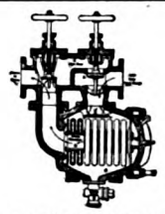

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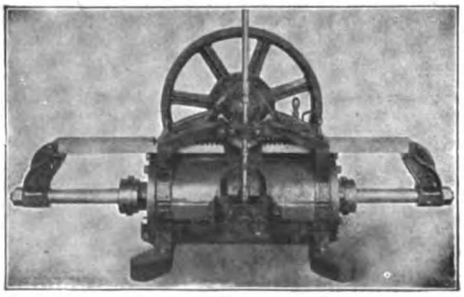

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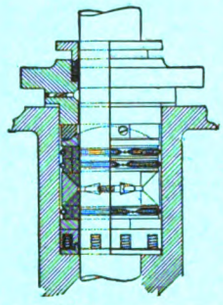

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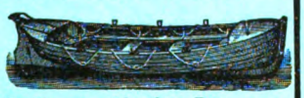

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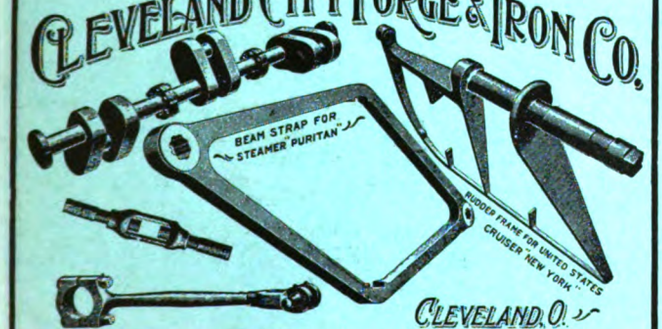

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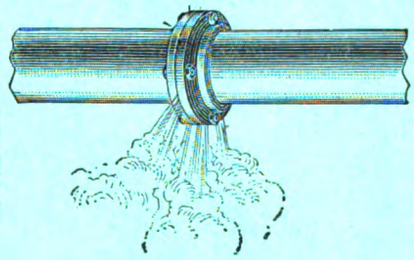

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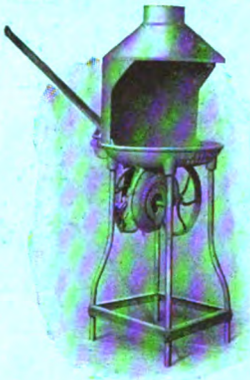

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